

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 1
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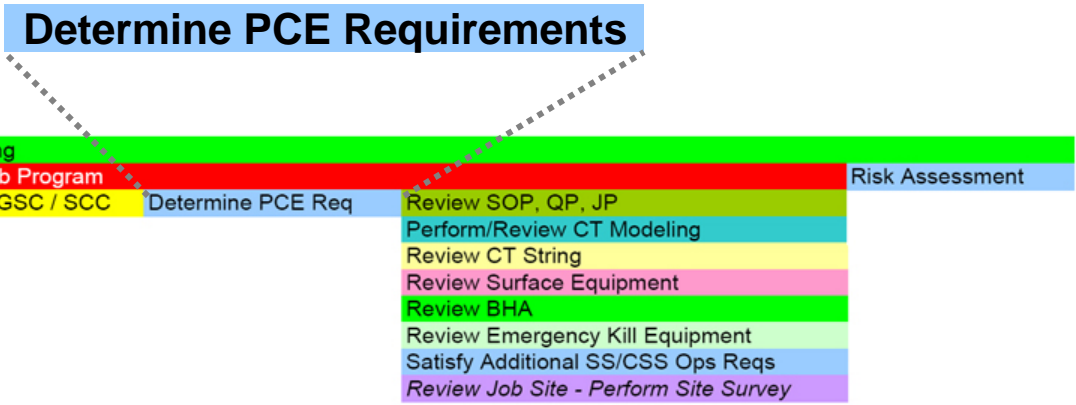
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.
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Page Title: Introduction

Content:

Welcome to Module 1, Lesson 2 of ConocoPhillips’ Coiled Tubing online course. In this lesson you will learn about the requirements and standards for the next step in the Pre-Planning stage of your CT Operation’s Job Program: namely, “Determining Pressure Control Equipment (PCE) Requirements.”



In this lesson, you will explore ConocoPhillips Pressure Control Equipment Requirement Standards as they pertain to Coiled Tubing Operations.



Media & Interaction:


Navigation: To begin this lesson, please click on the “Next” button.

Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25


Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 2
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Pressure Control Equipment			
<p>Content: Pressure Control Equipment (PCE)</p> <p>You have learned the first step in developing a Job Program is to categorize your well by GSC and Service Category. This is done upfront in the process so that you can make sure your well's PCE stack configuration meets the pressure requirements of the particular service category.</p> <p>The required steps in reviewing the PCE for your CT Operations are as follows:</p> <ul style="list-style-type: none">  • Verify the PCE meets ConocoPhillips requirements for the service category.  • Verify the materials used in the PCE are suitable for the application, environmental conditions, and fluids exposure. • For SS operations, verify the elastomers are compatible with the H2S inhibitors proposed for the job. • If Strippers are required by the service category or ConocoPhillips, install new stripper elements and a new set of anti-extrusion rings. • Replace the wear bushings and other components as necessary. 		<p>Media & Interaction:</p>	
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.0 to 11.25</p>			

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 3
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Maximum Allowable Working Pressure (MAWP)			
<p>Content: Maximum Allowable Working Pressure (MAWP)</p> <p>After you have verified that your PCE is correct for your well's Service Category, the next step is making sure your PCE passes Pressure Testing.</p> <p>All PCE installed on a well or flowline must pass pressure testing prior to opening the well or flowline.</p> <p>The Maximum Allowable Working Pressure (MAWP) of PCE should be the greater of:</p> <ul style="list-style-type: none"> • Regulatory requirements • MPSP plus the pressure margin require to kill the well 	<p>Media & Interaction:</p>		
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.0 to 11.25</p>			




Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 4
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Fluid and Temperature Compatibility			
<p>Content: Fluid and Temperature Compatibility</p> <p>The next step in determining PCE requirements for your well is making sure your PCE components are able to withstand exposure to the fluids and temperatures expected during the operation.</p> <p>Fluid Compatibility</p> <p>All PCE components must be rated for continuous exposure to the proposed treatment fluids and expected wellbore fluids at the maximum temperature expected during the operation.</p> <p>Temperature Compatibility</p> <p>All PCE components must be rated for operation at:</p> <ul style="list-style-type: none"> • Continuous exposure to the flowing wellhead temperature • The maximum and minimum expected operating temperature 	<p>Media & Interaction:</p> 		
Navigation: To navigate to the next page, please click on the “Next” button.			
Notes to Developer: CT Manual Sections 11.0 to 11.25			

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 5
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: End Connections			
<p>Content: Requirements for End Connections</p> <p>For GSC 0 and GSC 1 operations, the connection to the wellhead can be any design accepted by ConocoPhillips.</p> <p>For all CT operations except GSC 0 and GSC 1 operations, the connection to the wellhead shall be flanged or metal to metal sealing.</p> <p>All connections on PCE above the BOP shall be flanged, metal-to-metal sealing, or quick-connects accepted by ConocoPhillips.</p>		<p>Media & Interaction:</p>	
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.0 to 11.25</p>			

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 6
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Minimum Bore Diameter			
Content: Minimum Bore Diameter The minimum bore diameter of the PCE should be large enough to freely pass a completely flattened section of the CT string. 	Media & Interaction: Link to API 16ST flattening calculation COPY FROM HAYES		
Navigation: To navigate to the next page, please click on the “Next” button.			
Notes to Developer: CT Manual Sections 11.0 to 11.25			

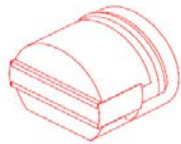
Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 7
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: BOP RAM REQUIREMENTS			
<p>Content: BOP Ram Requirements</p> <p>Hand Wheels Hand wheels should be installed at all times on each set of BOP rams so equipped.</p> <p>BOP Rams Labeling Each BOP ram body should have a durable external label identifying the function of the ram inside.</p> <p>Tubing Guides BOP pipe, slip, and pipe/slip combination rams should have tubing guides to align the CT with the centerline of the BOP bore prior to engagement of the seals or slip dies.</p> <p>Ram Locks Each BOP ram operating mechanism should be capable of locking the ram in the “closed” position.</p> <p>Ram Position Indicator Each BOP ram should be equipped with an external visual indicator of the ram’s position.</p>	<p>Media & Interaction:</p>		
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.0 to 11.25</p>			



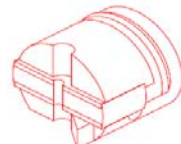
Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 8	
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.			
Page Title: Blowout Preventer Components				
<p>Content: Blowout Preventer (BOP) Components</p> <p>BOP refers to the PCE containing individual or combination blind, shear, slip, and pipe rams.</p> <p>Blind Rams CT blind and shear/blind (or shear/seal) combination rams shall be capable of sealing the open wellbore at MPSP.</p> <p>Shear Rams CT shear and shear/blind (or shear/seal) combination rams shall be capable of efficiently severing the thickest wall section of the CT string and internal cable, if so equipped, under the following conditions:</p> <ul style="list-style-type: none"> • At MPSP • With no tension in the CT <p>Slip Rams CT slip and pipe/slip combination rams shall be capable of securely holding the CT.</p> <p>Pipe Rams CT pipe and pipe/slip combination rams shall be capable of sealing around the stationary CT at 125% MPSP, MAWP of the wellhead, or MAWP of the rams, whichever is less.</p> <p>All CT pipe and pipe/slip combination rams shall have a means of equalizing the pressure across the pipe seals.</p>	<p>Media & Interaction:</p> 			
Navigation: To navigate to the next page, please click on the “Next” button.				
Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25				

Course: COILED TUBING CBT **Module:** PLAN FOR PRESSURE**Module:** 1**Lesson:** 2**Slide No:** 9**Lesson:** DETERMINING PCE REQUIREMENTS – BOPS**Learning Objectives:** Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.**Page Title:** Blowout Preventer Components**Content: Standards for Blowout Preventer (BOP) Components**

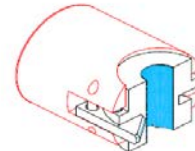
BOP refers to the PCE containing individual or combination blind, shear, slip, and pipe rams.



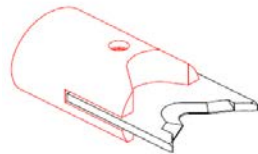
BLIND RAM ASSEMBLY



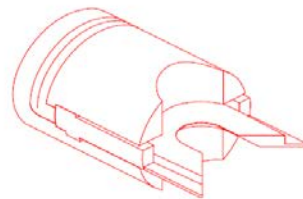
PIPE RAM ASSEMBLY



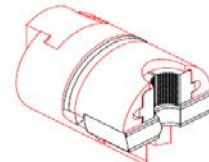
SLIP RAM ASSEMBLY



SHEAR RAM ASSEMBLY



SHEAR/SEAL RAM ASSEMBLY




PIPE/SLIP RAM ASSEMBLY

All CT pipe and pipe/slip combination rams must have way to equalize the pressure across the pipe seals.

Navigation: To navigate to the next page, please click on the “Next” button.**Notes to Developer:** CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25**Media & Interaction:**

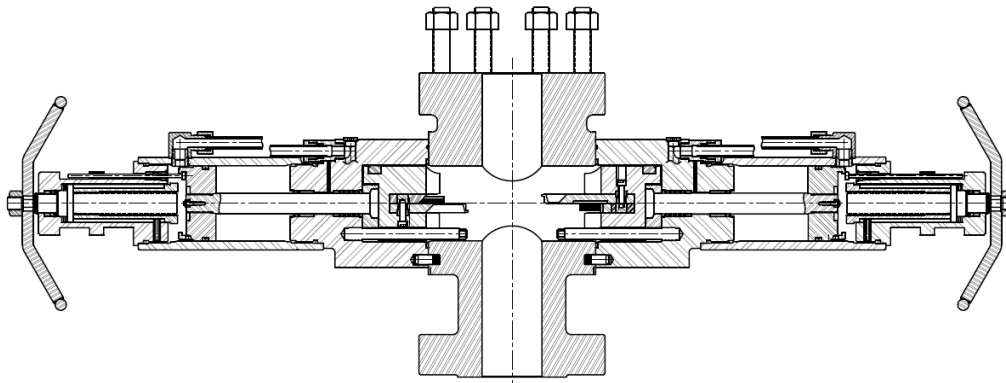
Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 10
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Slip Rams Use			
<p>Content: Slip Rams Use</p> <p>Do not use the slip rams during normal operations.</p> <p>Before releasing the slip rams from gripping the CT, verify the injector head is fully operational and gripping the CT with enough force to prevent it from moving.</p> <p>After the slip rams are used, visually inspect the surface of the CT contacted by the rams for signs of scratches, gouges, or dents before continuing operations.</p> <p>Do not run CT containing a dent, scratch, or gouge exceeding 10% of the tubing wall thickness below the slip rams without conducting a JSA. If possible, either repair the surface of the CT or remove the damaged tubing from the string.</p>		<p>Media & Interaction:</p>	
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: <i>CT Manual Sections 17.5 to 17.12</i></p>			

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 11
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Primary Pressure Control Equipment (PPCE)			
<p>Content: Primary Pressure Control Equipment (PPCE)</p> <p>The Primary Pressure Control Equipment (PPCE) consists of an annular sealing element capable of sealing around the moving CT at MAWP of the PPCE.</p> <p>If the PCE contains more than one stripper, the top stripper should be the active stripper during normal operations.</p> <p>Each stripper should allow change-out of the CT sealing elements (packers), wear bushings, and anti-extrusion rings with the CT through the stripper.</p>	<p>Media & Interaction:</p> 		
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25</p>			

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 12
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Secondary Pressure Control Equipment (SPCE)			
<p>Content: Secondary Pressure Control Equipment (SPCE) Standards</p> <p>If required by the service class or service category, the Secondary Pressure Control Equipment (SPCE) shall be a BOP stack having the following functions from the top down:</p> <ul style="list-style-type: none"> • Blind rams • Shear rams • Side outlet port • Slip rams • Pipe rams <p>The lower-most set of rams shall mount directly onto the wellhead crown (upper) valve, swab valve or onto the top of the riser, whichever applies.</p>	<p>Media & Interaction:</p>		
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25</p>			

Course: COILED TUBING CBT **Module:** PLAN FOR PRESSURE**Module:** 1**Lesson:** 2**Slide No:** 13**Lesson:** DETERMINING PCE REQUIREMENTS – BOPS**Learning Objectives:** Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.**Page Title:** Secondary Pressure Control Equipment (SPCE)**Content:** Secondary Pressure Control Equipment (SPCE) Standards**Single Ram BOP**

If four (4) single-ram BOPs are substituted for a quad BOP, a flow cross between the shear rams and the slip rams should provide the function of the side port.

**Media & Interaction:****Navigation:** To navigate to the next page, please click on the “Next” button.**Notes to Developer:** CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25

Course: COILED TUBING CBT **Module:** PLAN FOR PRESSURE

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Lesson: DETERMINING PCE REQUIREMENTS – BOPS

Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.

Page Title: Secondary Pressure Control Equipment (SPCE)

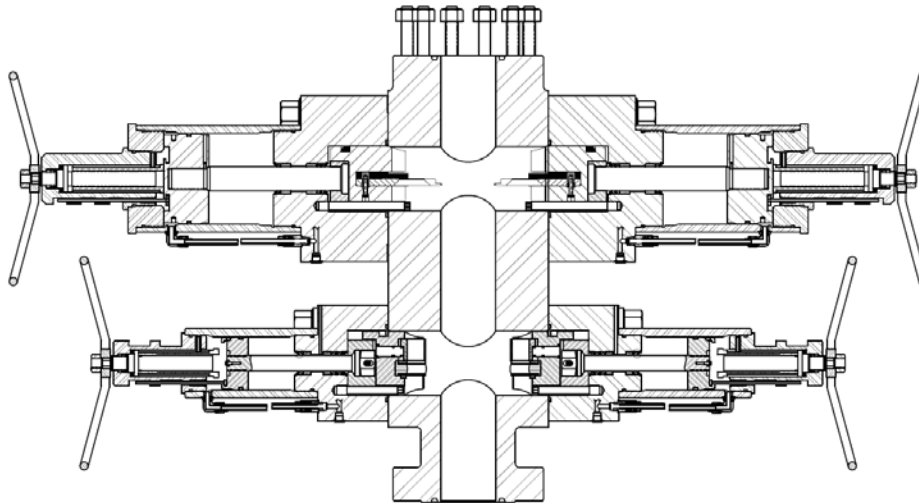
Content: Secondary Pressure Control Equipment (SPCE) Standards

Twin-Ram Combination BOP

A twin-ram combination BOP, if used, should have the following configuration from the top down:

- Shear/blind (or shear/seal) combination rams
- Side port
- Slip/pipe combination rams


If two (2) single-ram combination BOPs are substituted for a twin-ram combination BOP, a flow cross between the shear/blind rams and the slip/pipe rams should provide the function of the side port.




Media & Interaction:

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Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 15
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Tertiary Pressure Control Equipment (TPCE)			
<p>Content: Tertiary Pressure Control Equipment (TPCE) Standards</p> <p>Tertiary Pressure Control Equipment (TPCE), if required by the service class or service category, consists of a BOP stack providing fully redundant blind, shear, slip, and pipe ram functions mounted directly onto the wellhead crown (upper) valve or onto the top of the riser, whichever applies.</p>	<p>Media & Interaction:</p> 		
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25</p>			

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 16
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Flow Cross (Tee)			
<p>Content: Flow Cross (Tee) Requirements</p> <p>If required by ConocoPhillips, or when the return flow from the wellbore contains acid or abrasive solids, install a flow cross (tee) below the upper pipe ram in the BOP stack.</p> <p>Install another pipe ram below the flow cross mounted directly on the wellhead crown (upper) valve.</p> <p>Each side outlet of the flow cross should be equipped with tandem plug or gate valves.</p> <p>Take returns through the flow cross instead of the side outlet port in the BOP.</p>		<p>Media & Interaction:</p>	
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<p>Notes to Developer: CT Manual Sections 11.15 to 11.18</p>			

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 17
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Riser and Lubricator Sections			
Content: Riser and Lubricator Sections Riser and lubricator components, if required for the CT operation, shall meet the same materials requirements and pressure ratings as the SPCE. 	Media & Interaction:		
Navigation: To navigate to the next page, please click on the “Next” button.			
Notes to Developer: CT Manual Sections 11.15 to 11.18			

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Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: Qualification of Riser and Lubricator Sections			
<p>Content: Riser and Lubricator Section Qualifications</p> <p>If requested by ConocoPhillips, Service Providers should provide documentation for ConocoPhillips approval that qualifies the given Service Provider’s riser and lubricator sections to withstand simultaneous application of the following external loads without buckling or plastic deformation.</p> <p>The compressive force equal to the sum of the:</p> <ul style="list-style-type: none"> • Weight of the CT injector head • PCE components above the riser or lubricator sections • The maximum tension in the CT required for the job <p>The bending moment cause by the sum of the:</p> <ul style="list-style-type: none"> • Maximum reel back tension • Typical wind loads for the job site <p>Calculations should assume atmospheric pressure inside the riser. Allowance for support from a crane should not exceed 80% of the crane’s rated capacity at the required lifting radius and height.</p>		<p>Media & Interaction:</p>	
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.15 to 11.18</p>			

Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 19
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: CT Safety Head			
<p>Content: CT Safety Head Standards</p> <p>The CT Safety Head, if required by the service class or service category, shall meet the following requirements:</p> <ul style="list-style-type: none"> • Requirements for CT blind rams per Section 11.11.1 • Requirements for CT shear rams per Section 11.11.2 • Minimum nominal bore shall be equal to or greater than wellhead bore • Shear and seal capability shall be available with the CT in any state of axial loading • Capable of shearing ten (10) parallel sections of tubing with outside diameter (OD) = 1.25 inch and wall thickness = 0.109 inch • Capable of shearing three (3) parallel sections of tubing with OD = 2.00 inch and wall thickness = 0.188 inch • Capable of shearing two (2) parallel sections of tubing with OD = 2.875 inch OD and wall thickness = 0.188 inch 	<p>Media & Interaction:</p>		
<p>Navigation: To navigate to the next page, please click on the “Next” button.</p>			
<p>Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25</p>			



Course: COILED TUBING CBT Module: PLAN FOR PRESSURE	Module: 1	Lesson: 2	Slide No: 20
Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: ASSESSMENT			
<p>(Multiple choice) The Maximum Allowable Working Pressure (MAWP) of PCE should be the greater of/lesser of/equal to both:</p> <ul style="list-style-type: none"> Regulatory requirements MPSP plus the pressure margin require to kill the well <p>-answer: greater of</p> <p>(Multiple Choice) A flanged or metal to metal sealing connection to the wellhead is required for the following GSC, select all that apply</p> <ul style="list-style-type: none"> (a) GSC 0 (b) GSC1 (c) GSC 2 (d) GSC 3 (e) GSC 4 <p>-answer (c) (d) (e)</p> <p>(Drag & Drop) From the top down, list the required rams on a Secondary PCE (have 4 drag&drop windows)</p> <p>-Answer Blind, Shear, Slips, Pipe</p> <p>(Pick from Pictures) Select the BOP/BOP combinations that qualify as Tertiary PCE</p> <p>-have a picture of a stripper, a quad, a combi and a single to choose from (label rams)</p> <p>(Multiple Choice) Safety head question</p>		Media & Interaction:	
Navigation: To navigate to the next page, please click on the “Next” button.			
Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25			

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Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.		
Page Title: ASSESSMENT			
<p>QUESTIONS COVERING:</p> <ul style="list-style-type: none"> Pressure Control Equipment (PCE) 11.1 Maximum Allowable Working Pressure (MAWP) 11.2 Fluid Compatibility 11.3 Temperature Compatibility 11.4 End Connections 11.5 Minimum Bore Diameter 11.6 Hand Wheels 11.7 BOP Rams Labeling 11.8 Tubing Guides 11.9 Ram Locks 11.10 Ram Position Indicator 11.11 Blowout Preventer (BOP) Components <ul style="list-style-type: none"> 11.11.1 Blind Rams 11.11.2 Shear Rams 11.11.3 Slip Rams 11.11.4 Pipe Rams 11.12 Primary Pressure Control Equipment (PPCE) 11.13 Secondary Pressure Control Equipment (SPCE) <ul style="list-style-type: none"> 11.13.1 Single Ram BOP 11.13.2 Twin-Ram Combination BOP 11.14 Tertiary Pressure Control Equipment (TPCE) 11.15 Flow Cross (Tee) 11.16 Riser and Lubricator Sections 11.17 Qualification of Riser and Lubricator Sections 11.18 CT Safety Head 	Media & Interaction:		
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Lesson: DETERMINING PCE REQUIREMENTS – BOPS	Learning Objectives: Identify and ensure that the PCE stack configuration meets the pressure requirements for each Service Category.
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Page Title: Conclusion

Content:

Congratulations! You have successfully completed Module 1, Lesson 2 of ConocoPhillips’ Coiled Tubing online course. In this lesson you explored the standards and procedures governing the second step in the Pre-Planning stage of your CT Operation’s Job Program: “Determining PCE Requirements” and learned more about BOPs.

In the next lesson – Module 1, Lesson 3 - you will further explore Requirements and Standards for Pressure Control Equipment as they relate to stacks.

Media & Interaction:

Navigation: To end this lesson and exit the module, please click on the “exit” button. To begin the next lesson, please click on the “Next” button.

Notes to Developer: CT Manual Sections 11.11 to 11.13.2; 11.20 to 11.20.5; 11.22 to 11.25