

# Collet Connectors

Connectors for BOP stacks

### Drilling challenge

Offshore drilling environments have ventured into increased water depths, greater pressures, and harsher environments. Collet connectors need to be reliable with a long fatigue life to help drillers improve safety, minimize operational downtime, and maximize equipment availability and uptime.

### Cameron collet connectors

Our collet connectors continue evolving to provide greater bending and tension capabilities in deeper waters and higher pressures. These collet connectors are designed to withstand the bending stresses and separating forces caused by well pressure, riser tension, and vessel motion for long, reliable operation. With five models to choose from, our collet connectors meet various preload requirements to help resist hub separation. All of these collet connectors utilize metal-to-metal sealing to ensure seal integrity and perform successful disconnect when required for enhanced operational safety.

Working pressures: up to 15,000 psi<sup>†</sup>

### Applications:

- BOP stack to wellhead connection
- LMRP to lower stack connection

### Features:

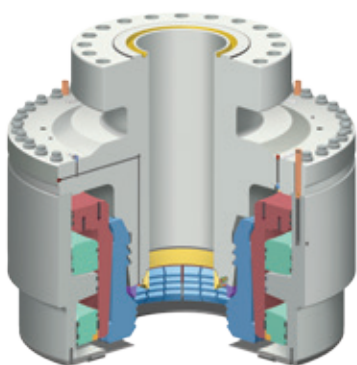
- High strength and stiffness with a direct load path through the connector
- Cameron-designed AX, CX, and AX/AT gaskets. Other gasket designs are also available
- Positively driven-open collet segments during unlock with a secondary unlock function for successful disconnect
- Inconel inlays on all sealing surfaces exposed to seawater
- Option of studded, flanged, or clamped tops
- Inherent self-locking characteristics

## Collet Connector Selection

Cameron offers five collet connector models that meet varying connection sizes and types, preload requirements, and height restraints.

### Technical Specifications

	Model 70	HC	HCH4	EVO-Con	DWHC
Preload, lbf	Up to 245,000	Up to 5.91 MM	Up to 4.34 MM	Up to 8.92 MM	Up to 12.05 MM
Height, in [mm]	38.45 [797.31]	44.00 [1117.60]	44.00 [1117.60]	63.06 [1601.7]	66.78 [1696.21]
Maximum Subsea Wellhead OD, in [mm]	31.39 [797.31]	31.39 [797.31]	27.00 [685.80]	30.00 [762.00]	35.25 [895.35]
Maximum Connector OD, in [mm]	64.00 [1625.60]	62.00 [1574.80]	62.00 [1574.80]	72.00 [1828.80]	75.25 [1911.35]

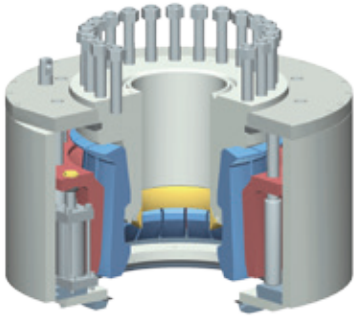


*EVO-Con collet connector*

### EVO-Con\* collect connector

- Built upon proven design
- Interchangeable parts allow ultimate versatility—the same connector fits various wellhead brands and sizes (including 27-in H4 and 30-in H4)
- Strength of DWHC with a shorter swallow
- Simple design has only one hydraulic circuit which uses less hydraulic fluid for locking and unlocking

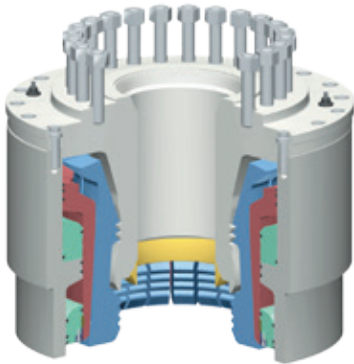
<sup>†</sup> Cameron is currently developing a 20,000 psi connector line of products



*Model 70 collet connector*

#### **Model 70\* collet connector**

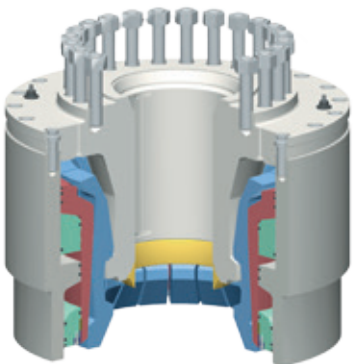
- Cylinders may be easily repaired or replaced
- Short swallow, tapered hub profile and positive unlocking system allow disconnection at angles up to 30°
- 25° angles on the clamp segment faces and a large actuating piston area create a greater clamping force at a given hydraulic pressure
- Standard manual override
- Actuated by hydraulic cylinders which provide high clamping preloads



*HCH4 collet connector*

#### **HCH4**

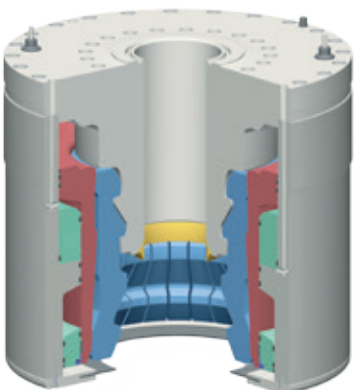
- Includes standard HC operating system and load carrying components
- Unique locking design includes three load shoulders on the collet segment or fingers, allowing the HC connector to lock onto an H4 wellhead and maintain a direct load path
- Designed specifically to fit on a mandrel-style hub
- Simple design has only one hydraulic circuit which uses less hydraulic fluid for locking and unlocking



*HC collet connector*

#### **HC\* high-capacity collet connector**

- Short swallow, tapered hub profile and positive unlocking system allows disconnection at angles up to 30°
- Shortest swallow of any major wellhead connector available on the market
- Large actuating piston area creates a greater preload at a given hydraulic pressure than the Model 70
- Higher applied loads can be tolerated without causing hub face separation because of the higher preloads
- Uses annular cylinder with larger annular piston for higher locking and unlocking force
- Compact design minimizes height and weight
- Has a hydraulic secondary unlock
- Simple design has only one hydraulic circuit which uses less hydraulic fluid for locking and unlocking

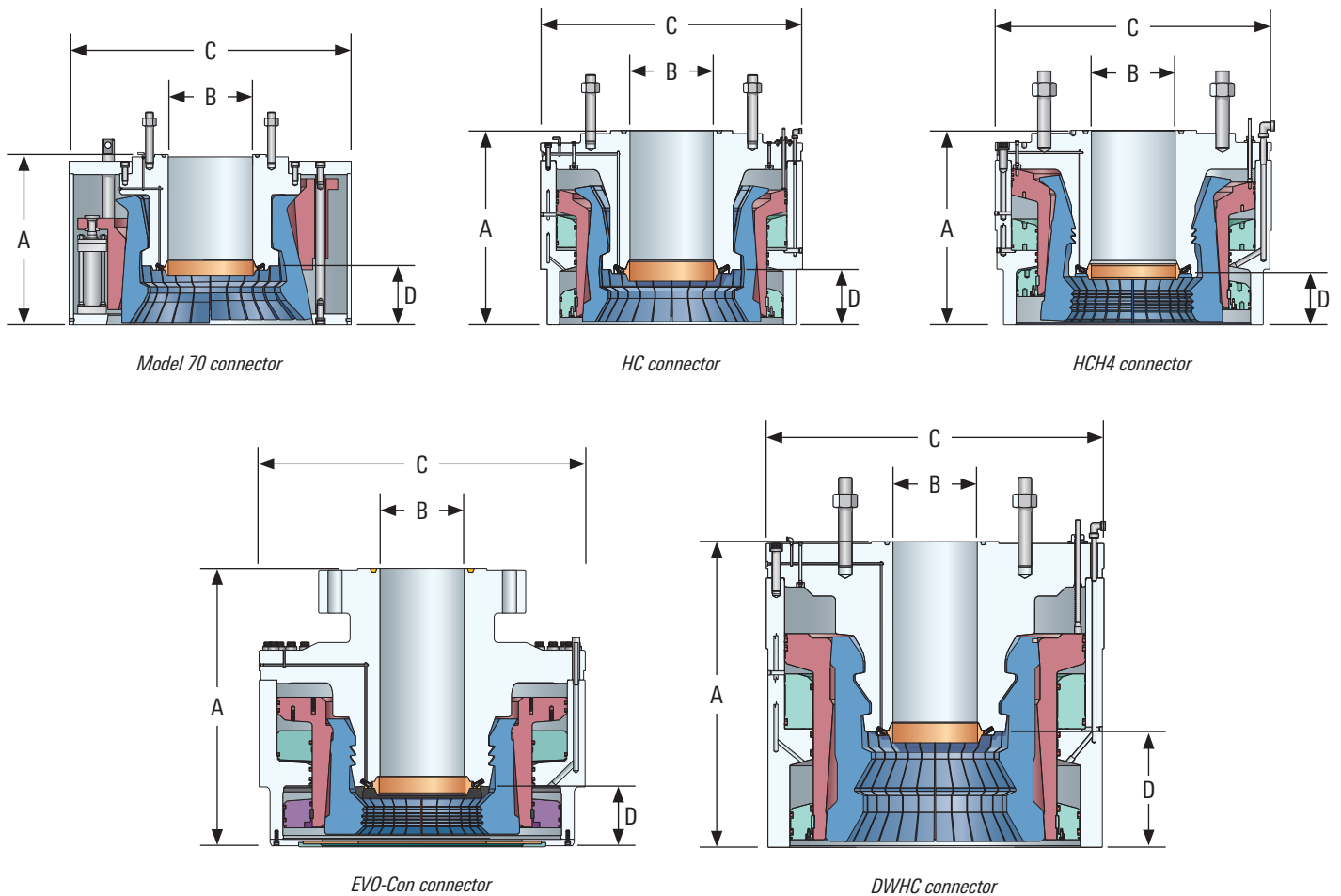


*DWHC collet connector*

#### **DWHC\* deepwater, high-capacity collet connector**

- Engineered for high loads encountered in ultra-deepwater applications
- Segment and hub geometry and a large actuating piston area create a greater clamping force
- Flange exceeds API standards with a thicker neck, a larger bolt circle, and a larger bolt diameter to match the capacity of the DWHC
- Hub profile accommodates high load-carrying capacity
- Provides 21MMlb total equivalent tension capacity, based on API design criteria
- Simple design has only one hydraulic circuit which uses less hydraulic fluid for locking and unlocking

# Operational Data and Dimensions



## Collet Connector Dimensions

Bore wellhead size, in	Working pressure, psi	Fluid requirements, galUS [L]		A, in [mm]	B, in [mm]	C, in [mm]	D, in [mm]	Weight, <sup>§</sup> lbm [kg]
		Open	Close					
<b>Model 70<sup>†</sup></b>								
18¾	10,000	4.97 [18.81] <sup>‡</sup>	6.27 [23.72]	38.28 [972.31]	18.75 [476.25]	64.00 [1625.60]	13.54 [339.85]	16,000 [7530]
<b>HC<sup>††</sup></b>								
18¾	10,000	18.50 [70.02]	14.90 [56.40]	44.00 [1117.60]	18.75 [476.25]	59.00 [1498.60]	12.50 [317.50]	20,600 [9,344]
18¾	15,000	25.00 [94.63]	20.00 [75.70]	43.71 [1110.23]	18.75 [476.25]	62.00 [1574.80]	12.50 [317.50]	23,100 [10,478]
<b>HCH4<sup>§§</sup></b>								
18¾	10,000	18.50 [70.02]	14.90 [56.40]	44.00 [1117.60]	18.75 [476.25]	59.00 [1498.60]	11.63 [295.40]	23,200 [10,524]
18¾	15,000	25.00 [94.63]	20.00 [75.70]	43.72 [1110.49]	18.75 [476.25]	62.00 [1574.80]	11.63 [295.40]	25,350 [11,499]
<b>EVO-Con<sup>††</sup></b>								
18¾, 27	15,000	36.12 [136.71]	28.37 [107.38]	63.06 [1601.7]	18.75 [476.23]	72.00 [1828.8]	13.24 [336.4]	44,902 [20,367]
18¾, 30	15,000	36.12 [136.71]	28.37 [107.38]	63.06 [1601.7]	18.75 [476.23]	72.00 [1828.8]	13.24 [336.4]	41,815 [18,967]
<b>DWHC</b>								
18¾	15,000	52.80 [199.85]	42.20 [159.73]	66.78 [1696.21]	18.75 [476.25]	75.25 [1911.35]	24.51 [622.55]	67,000 [30,391]

<sup>†</sup> Also available in the following sizes and working pressures—13¾ in 5000 and 10,000 psi; 16¾ in 10,000 psi.

<sup>§</sup> Additional 2.49 galUS [9.43 L] is necessary for secondary unlock.

<sup>‡</sup> Except for the EVO-Con, weights shown are for a studded top configuration.

<sup>††</sup> Also available in the following sizes and working pressure—13¾ in 15,000 psi; 21¼ in 5000 psi.

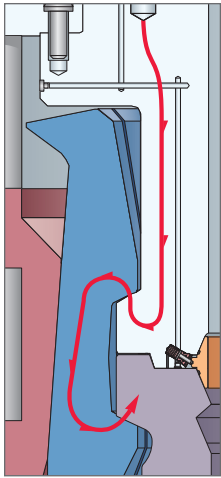
<sup>§§</sup> Also available in the following size and working pressure—16¾ in 10,000 psi.

<sup>†††</sup> Dimensions shown include hydrate seal and flanged top design.

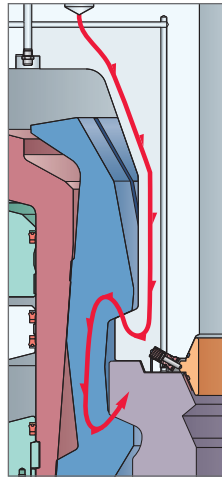
**Note:** Hydrate seal available for all models

# Load Paths

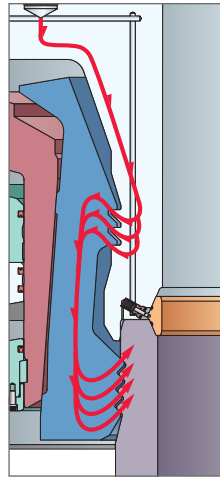
A load path is the way the applied loads are transmitted through the connector. The more direct the load path, the fewer components it travels through, yielding a stiffer, more stable connection. In turn, this stiff and stable connection directly affects resistance to hub face separation. All of Cameron collet connectors have direct load paths which provide high resistance to hub face separation.



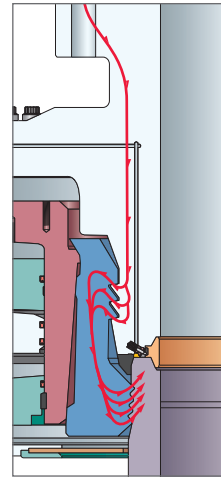
*Model 70 connector load path*



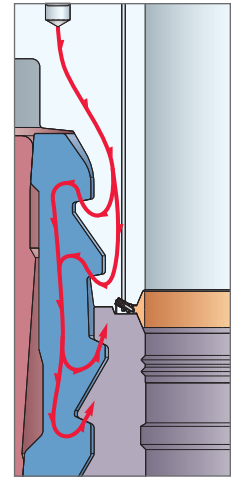
*HC connector load path*



*HCH4 connector load path*



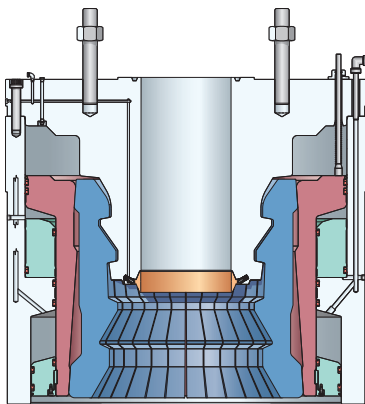
*EVO-Con connector load path*



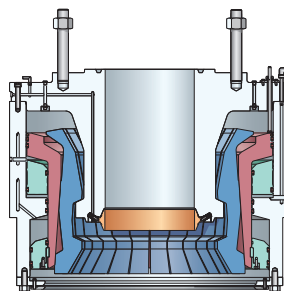
*DWHC connector load path*

# Connector Versatility

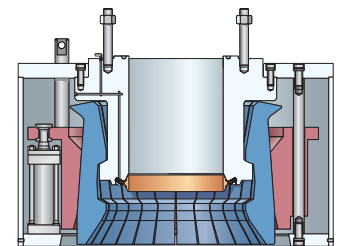
The DWHC collet connector can be used with the standard wellhead hub, as well as a unique, Cameron-designed dual wellhead hub profile. This DWHC hub allows other collet connectors to be used in applications where the loading requirements are not as severe. The DWHC collet connector locks onto the wellhead hub, while the standard HC collet connector or Model 70 lock onto the DWHC hub without any modification to either collet connector.



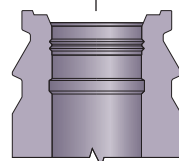
DWHC connector



HC connector

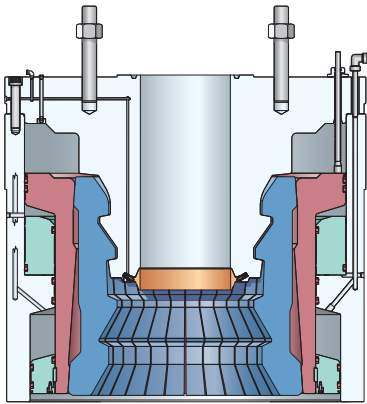


Model 70 connector

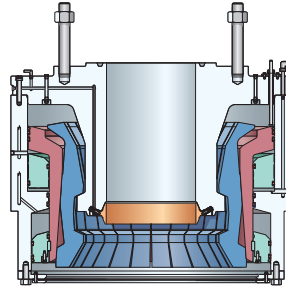


DWHC hub

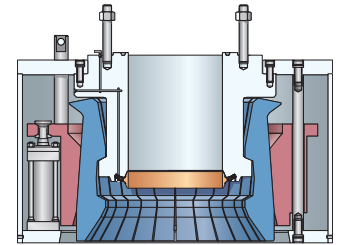
# Hub Interchangeability



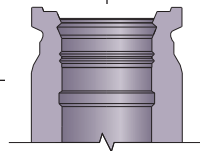
DWHC connector



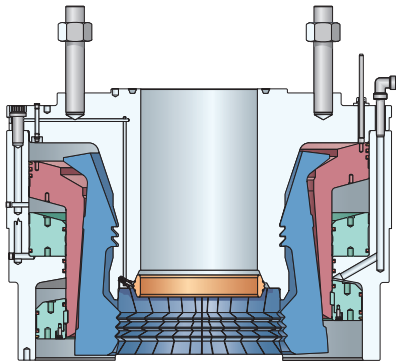
HC connector



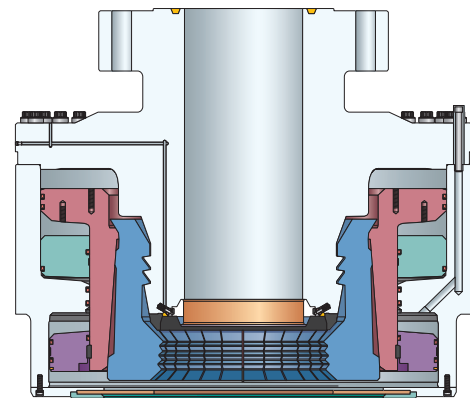
Model 70 connector



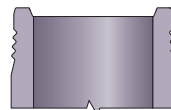
Standard hub



HCH4 connector



EVO-Con connector<sup>§</sup>



H4 Hub (27 in)

<sup>§</sup> The EVO-Con is available with an adapter kit for H4 27-in and 30-in wellheads.

# Collet Connector Data—Performance

Performance	Model 70	HC		HCH4		EVO-Con 27 in <sup>†</sup>	EVO-Con 30 in <sup>†</sup>	DWHC
		10,000 psi	15,000 psi	10,000 psi	15,000 psi			
Pressure rating, psi [MPa]	10,000 [69.00]	10,000 [69.00]	15,000 [103.40]	10,000 [69.00]	15,000 [103.40]	15,000 [103.40]	15,000 [103.40]	15,000 [103.40]
Bending at 0 pressure, 0 tension, <sup>†</sup> ft.lbf	3,645,000	4,048,000	5,293,000	2,961,000	3,316,000	5,650,000	8,550,000	11,000,000
Bending at 0 pressure, 0 tension, <sup>†</sup> N.m	4,942,000	5,488,000	7,176,000	4,014,000	4,516,000	7,660,000	11,592,000	14,914,000
Bending at 10M psi, 0 tension, <sup>†</sup> ft.lbf	1,706,000	3,219,000	3,308,000	3,045,000	3,975,000	5,800,000	9,040,000	10,100,000
Bending at 10M psi, 0 tension, <sup>†</sup> N.m	2,313,000	4,364,000	4,485,000	4,128,000	5,389,000	7,864,000	12,257,000	13,694,000
Bending at 10M psi, 2MM lb tension, <sup>†</sup> ft.lbf	549,000	2,063,000	2,151,000	2,109,000	2,969,000	4,800,000	7,960,000	9,100,000
Bending at 10M psi, 2MM lb tension, <sup>†</sup> N.m	744,000	2,797,000	2,916,000	2,859,000	4,025,000	6,508,000	10,792,000	12,338,000
Bending at 15M psi, 2MM lb tension, <sup>†</sup> ft.lbf	—	—	1,161,000	—	2,369,000	4,350,000	7,500,000	7,950,000
Bending at 15M psi, 2MM lb tension, <sup>†</sup> N.m	—	—	1,574,000	—	3,212,000	5,898,000	10,169,000	10,779,000
Preload, lbf	245,000	4,385,000	5,910,000	4,740,000	4,337,000	5,513,008	8,922,000	12,050,000
Preload, N	1,090,000	19,505,000	26,289,000	21,085,000	19,292,000	24,523,000	39,687,000	53,601,000
Load shoulder angle housing [connector]	25° [25°]	25° [25°]	25° [25°]	45° [0°]	45° [0°]	45° [0°]	45° [0°]	25° [10°]
Maximum release angle	≤30°	≤30°	≤30°	4°	4°	4°	4°	4° <sup>‡</sup>
Water depth rating, ft [m]	≤10,000 [3,048]	≤10,000 [3,048]	≤10,000 [3,048]	≤10,000 [3,048]	≤10,000 [3,048]	≤10,000 [3,048]	≤10,000 [3,048]	≤10,000 [3,048]
Connector style (hub, collet, etc.)	Collet with hub	Collet with hub	Collet with hub	Collet with hub	Collet with hub	Collet with hub	Collet with hub	Collet with hub
Maximum subsea wellhead OD, in [mm]	31.39 [97.31]	31.39 [797.31]	31.39 [797.31]	27.00 [685.80]	27.00 [685.80]	27.00 [685.80]	30.00 [762.00]	35.25 [895.35]
Maximum connector OD, in [mm]	64.00 [1,625.60]	59.00 [1,498.60]	62.00 [1,574.80]	59.00 [1,498.60]	62.00 [1,574.80]	72.00 [1,828.80]	72.00 [1,828.80]	75.25 [1,911.35]
Swallow, <sup>§</sup> in [mm]	13.38 [339.85]	12.50 [17.50]	12.50 [317.50]	11.63 [295.40]	11.63 [295.40]	11.51 [292.35]	11.51 [292.35]	24.51 [622.55]
Operating pressure, psi nominal [maximum]	1,500 [3,000]	1,500 [3,000]	1,500 [3,000]	1,500 [3,000]	1,500 [3,000]	1,500 [2,000 max] <sup>††</sup>	1,500 [3,000]	1,500 [1,500 max] <sup>§§</sup>
Operating pressure, MPa nominal [maximum]	10.30 [20.60]	10.30 [20.60]	10.30 [20.60]	10.30 [20.60]	10.30	10.30 [13.70]	10.30 [20.60]	10.30 [20.60]

<sup>†</sup> Ratings are based on API allowable stresses for normal design loads. Bending capacities listed above are for the connector. The top connection will provide bending capacity limitations.

<sup>§</sup> Wellhead datum to bottom of connector. If the hydrate seal is used, the swallow will increase by approximately 2 in [50.8 mm].

<sup>‡</sup> The 4° release angle limit applies to initial connector/wellhead lift off of 0 to 1 in [25.4 mm]. For greater than 1 in [25.4 mm] of lift off, the connector can be rotated up to 6° while clearing the wellhead.

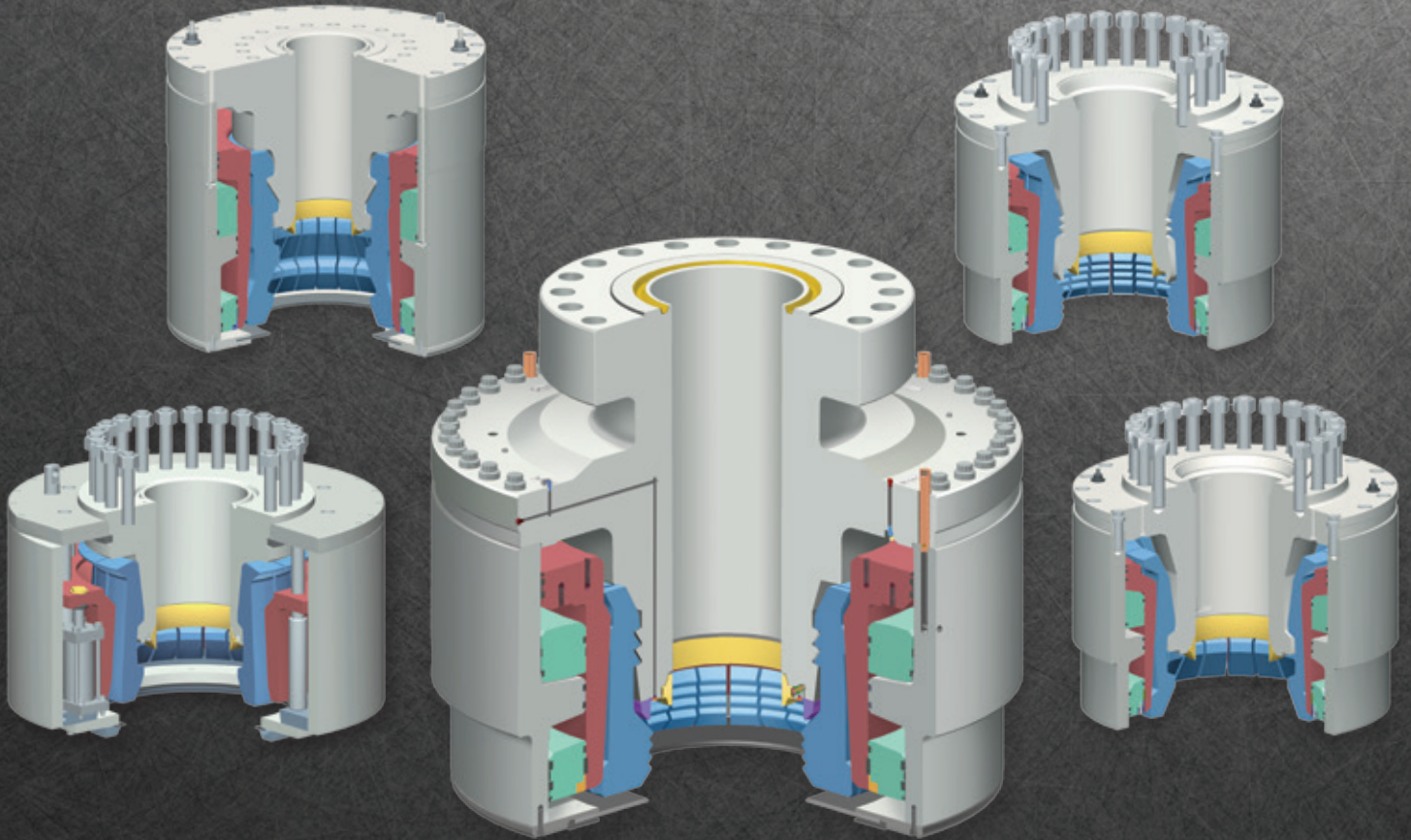
<sup>††</sup> Exceeding 2,000 psi maximum lock pressure may result in damage of the 27-in wellhead.

<sup>§§</sup> Exceeding 1,500 maximum lock pressure may result in damage of the wellhead.

<sup>†††</sup> Interchange kit available for 27-in and 30-in H4 profiles.

Additional options and capacities are available. Contact your Cameron representative for more information.

# Collet Connectors



[cameron.slb.com/colletconnectors](http://cameron.slb.com/colletconnectors)

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