

OILGEAR PROPRIETARY – PATENT PENDING

OILGEAR

Subsea Boosting and Regulating System (BARS™)

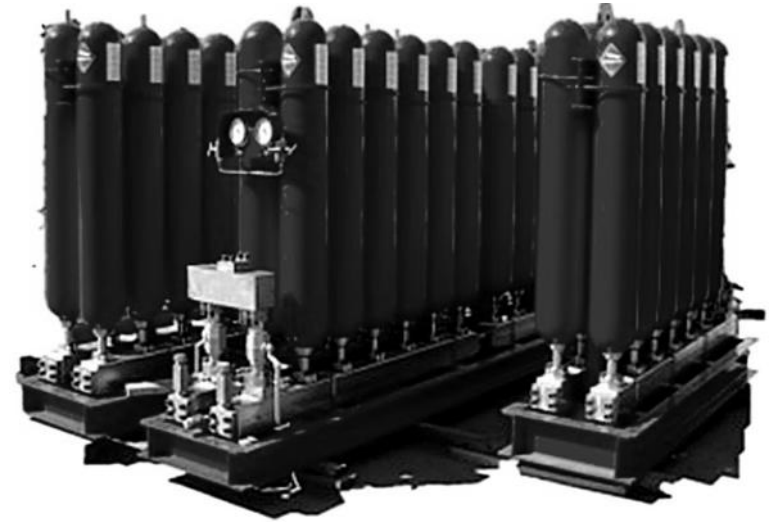
NON-CONFIDENTIAL

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Problem Statement

Deep water, combined with ever-increasing actuation requirements, presents an inherent problem for subsea control systems

- Storing energy in classic, pneumatic accumulators becomes less and less effective the deeper the water



energy **API**



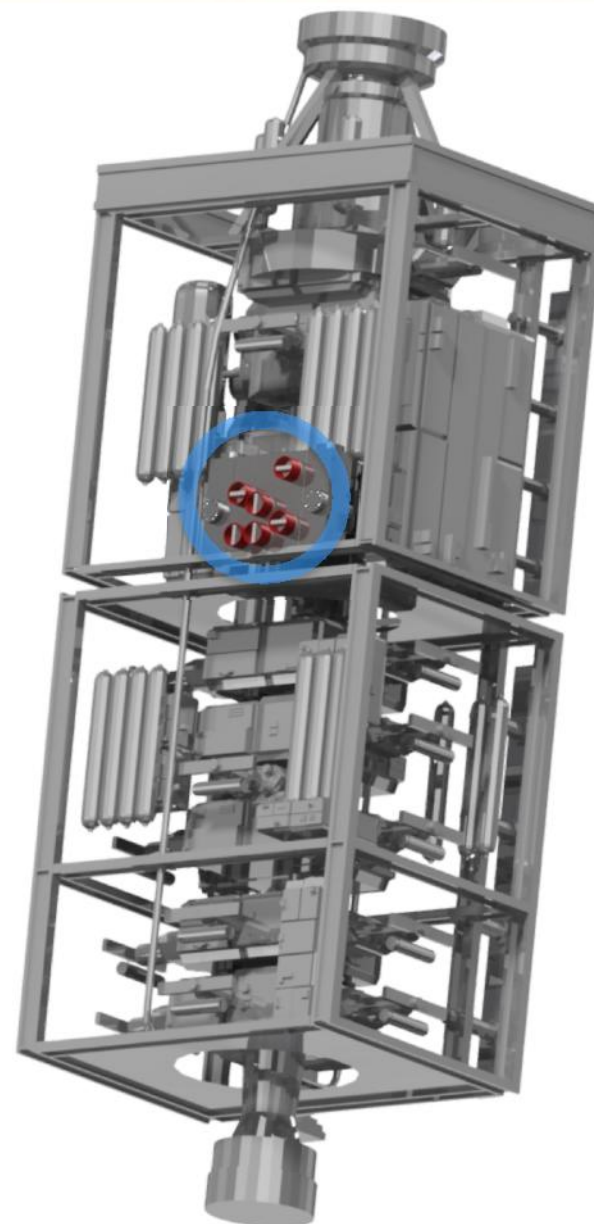
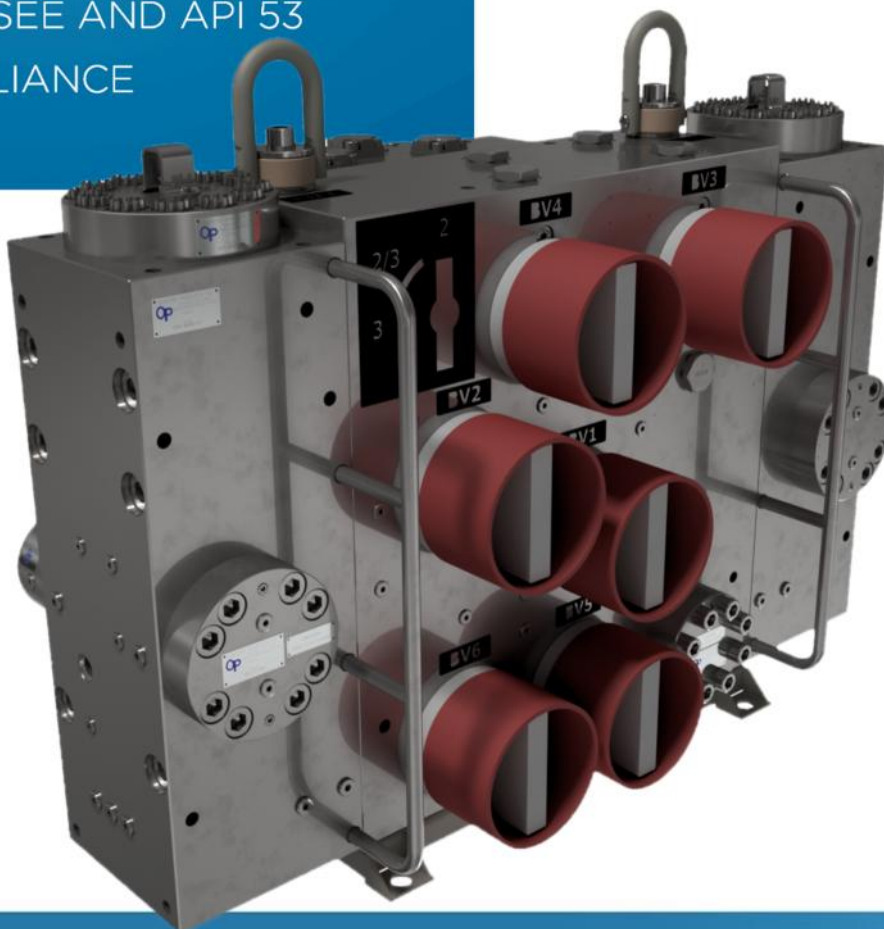
To meet API and BSEE standards using a typical subsea system:

Deeper water = More accumulators

The Oilgear Subsea BARS™

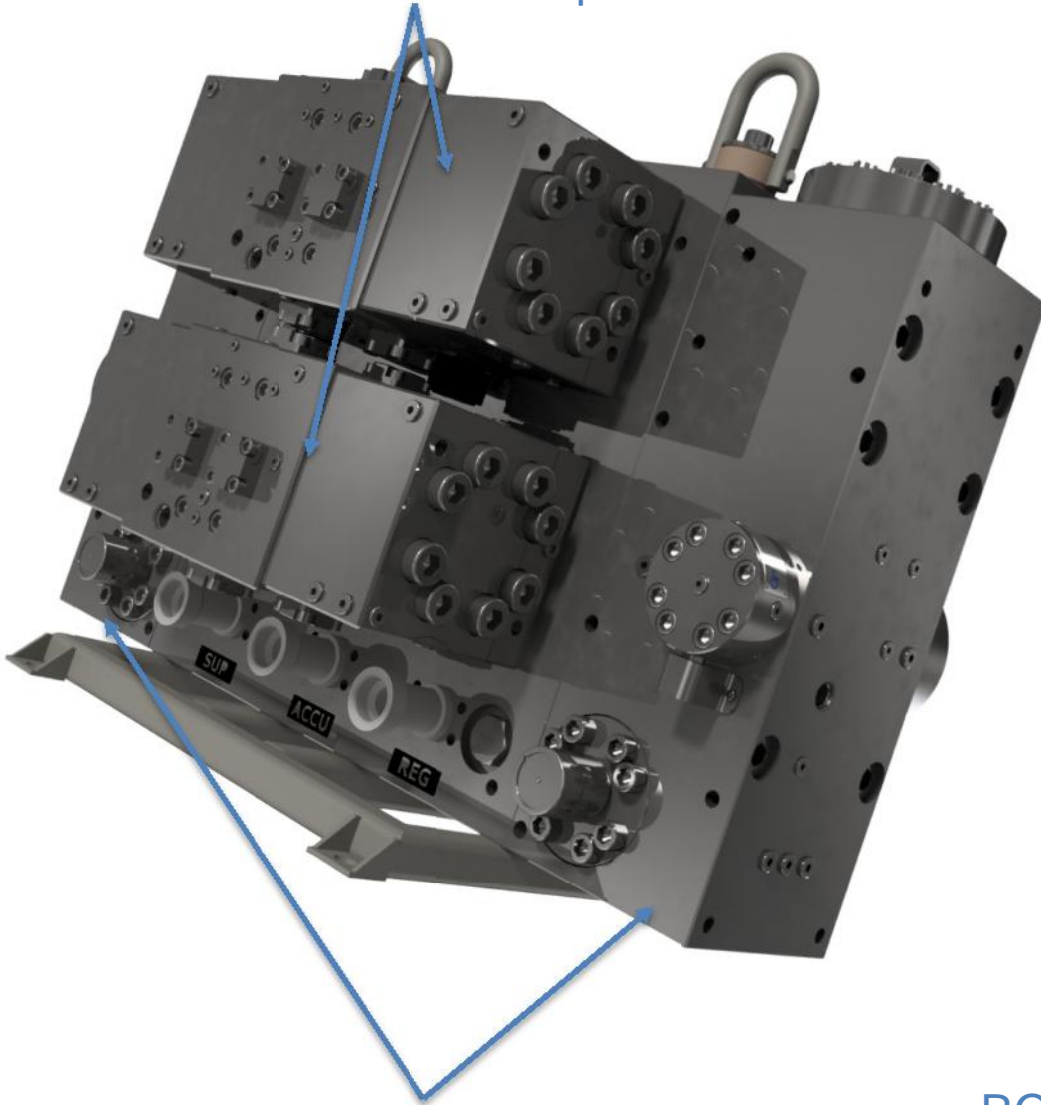
BOOSTING AND REGULATING SYSTEM

- SIGNIFICANTLY INCREASES STORABLE ENERGY
- FOR BSEE AND API 53 COMPLIANCE

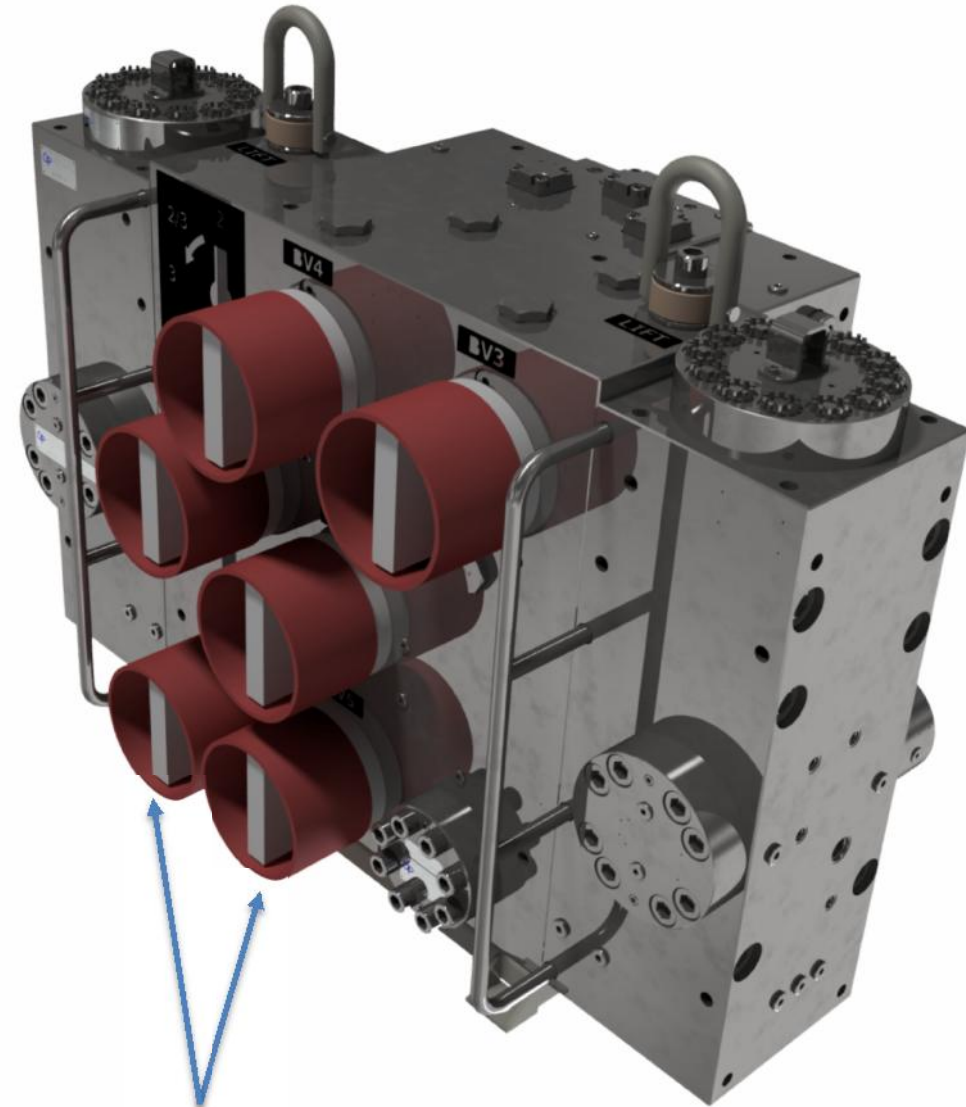


The Oilgear Subsea BARS™

Redundant Intensifier Pumps



Redundant Pressure Regulators



ROV Ball Valves for Isolation and Bypass

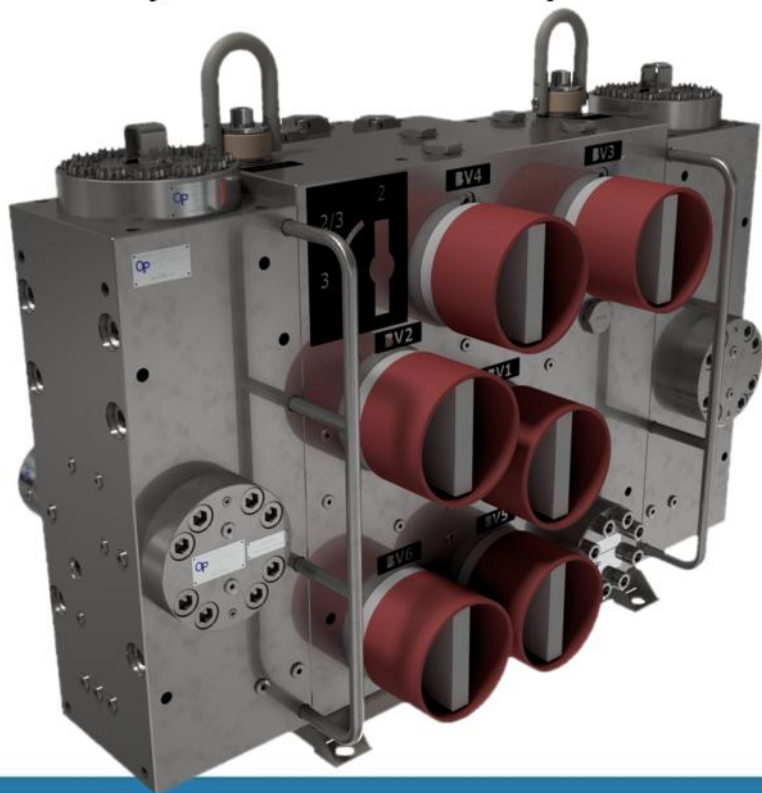
The Oilgear Subsea BARS™ Basics

Though the accumulators are often rated up to 7500 PSI, the rest of the control system is typically only rated for 5000 PSI

- So, there is an additional 2500 PSI that is presently unusable

Subsea BARS™ (Boosting and Regulating System)

- Increase the pressure in the subsea accumulators, without the need to increase the pressure ratings of the existing subsea piping and subsea hydraulic control system



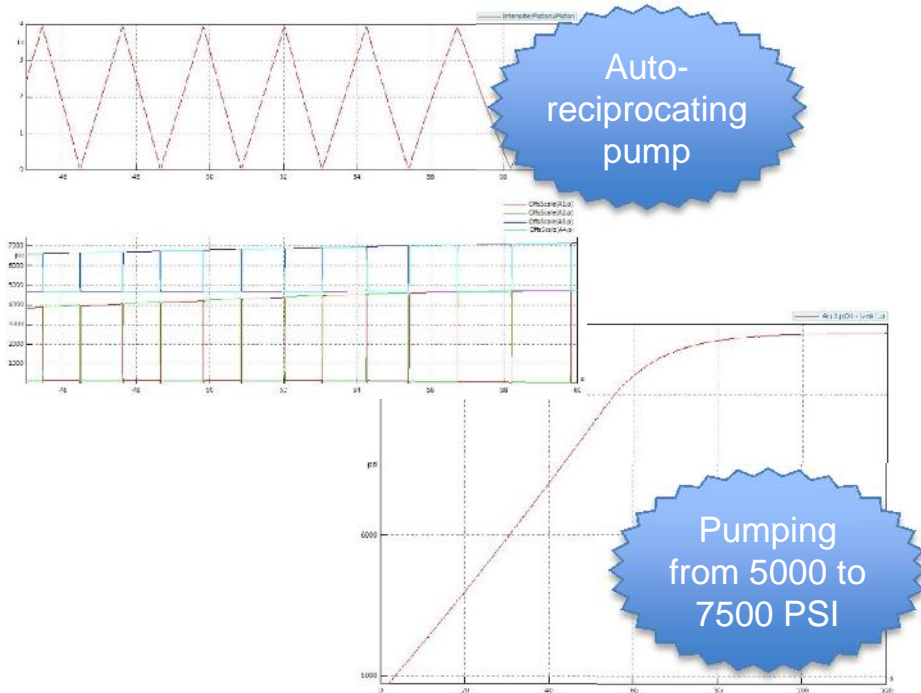
An intensifier and regulator all-in-one

- The BARS™ is placed between the subsea accumulators and the pod
- It boosts the pressure of the fluid that is incoming from the surface
- It regulates the pressure of the fluid that is outgoing to the pod
- 100% hydraulic design

How it Works

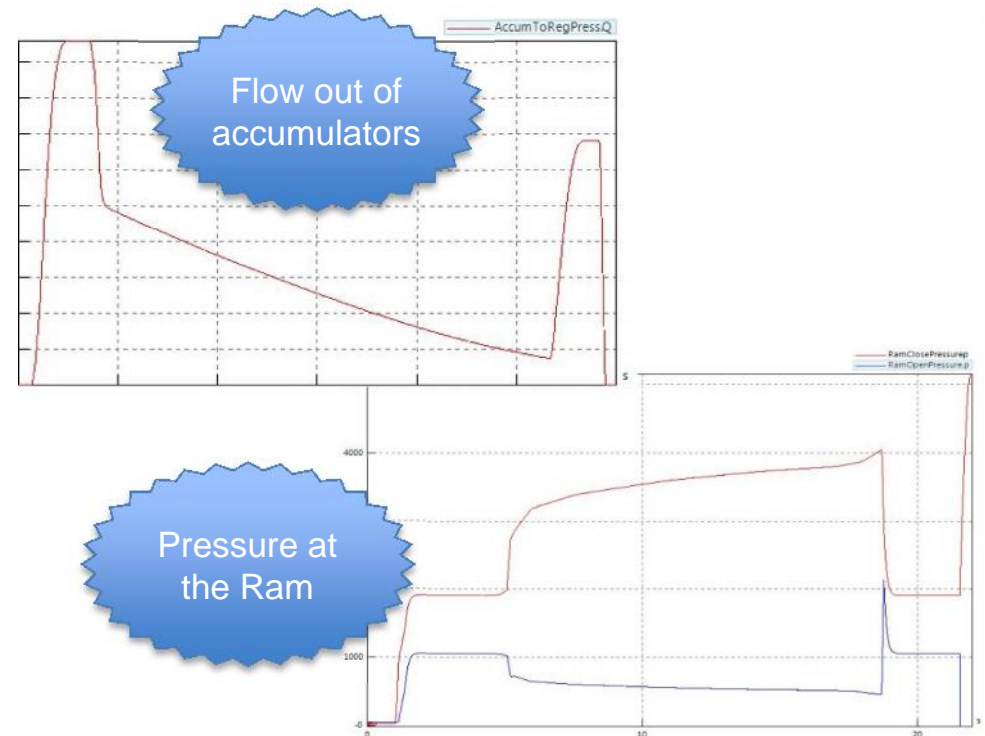
It Boosts the Stored Energy

- As control fluid comes down from the surface, the BARS™ units boosts the pressure in the subsea accumulators by way of proprietary Oilgear intensifier pumps



It Regulates the Downstream Pressure

- The BARS™ unit utilizes Oilgear's proprietary Regulator design
- LMRP, actuators, DCVs, SPMs – no modifications are required!**



Design and Features

Features:

- Automatically kicks-in only when needed
- Intensifier and regulator developed by Oilgear's Olmsted group
- No realtime-control required
- Fully redundant intensifiers and regulators
- ROV-controlled enable or bypass

Flows and pressures:

Incoming supply from surface

- Max flow: 175 GPM; Max pressure: 5000 PSI

Outgoing, un-boosted supply from BARS™ to subsea accumulators

- Max flow: 175 GPM; Max pressure: 5000 PSI

Outgoing, boosted supply from BARS™ to subsea accumulators

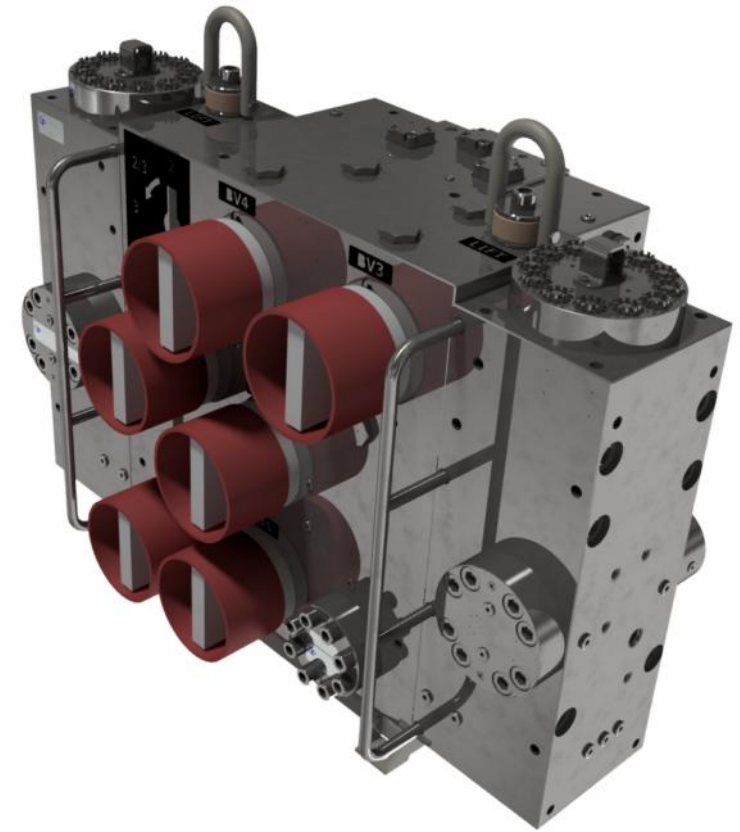
- Max flow: 4.5 GPM; Max pressure: 7500 PSI

Incoming supply from subsea accumulators to BARS™

- Max flow: 175 GPM; Max pressure: 7500 PSI

Outgoing, regulated supply from BARS™ to subsea functions

- Max flow: 175 GPM; Regulated pressure setpoint: 5000 PSI



Size and weight:

- 41" x 28" x 22"
- 4650 lbs

Real Scenario #1 – 4500 PSI CSR Requirement

Scenario details:

- **Accumulator Size:** 160 gal / each
- **Surface Nitrogen Pre-Charge:** 6920 psia at 90 F
- **Subsea Ambient Temperature:** 40°F
- **Minimum Required Casing Shear Ram Pressure:** 4500 psi

These calculations use actual rig data

Quantity of 160 Gallon Accumulators Needed		
Water Depth (ft)	Accumulator Charge Pressure	
	5000 psig (No BARS™)	7500 psig (With BARS™)
6000	28	7
7000	32	8
8000	35	8
9000	39	9
10000	43	10
11000	46	10
12000	50	11

~77% fewer accumulators

Real Scenario #2 – 4000 PSI CSR Requirement

Scenario details:

- **Accumulator Size:** 160 gal / each
- **Surface Nitrogen Pre-Charge:** 6920 psia at 90 F
- **Subsea Ambient Temperature:** 40°F
- **Minimum Required Casing Shear Ram Pressure:** 4000 psi

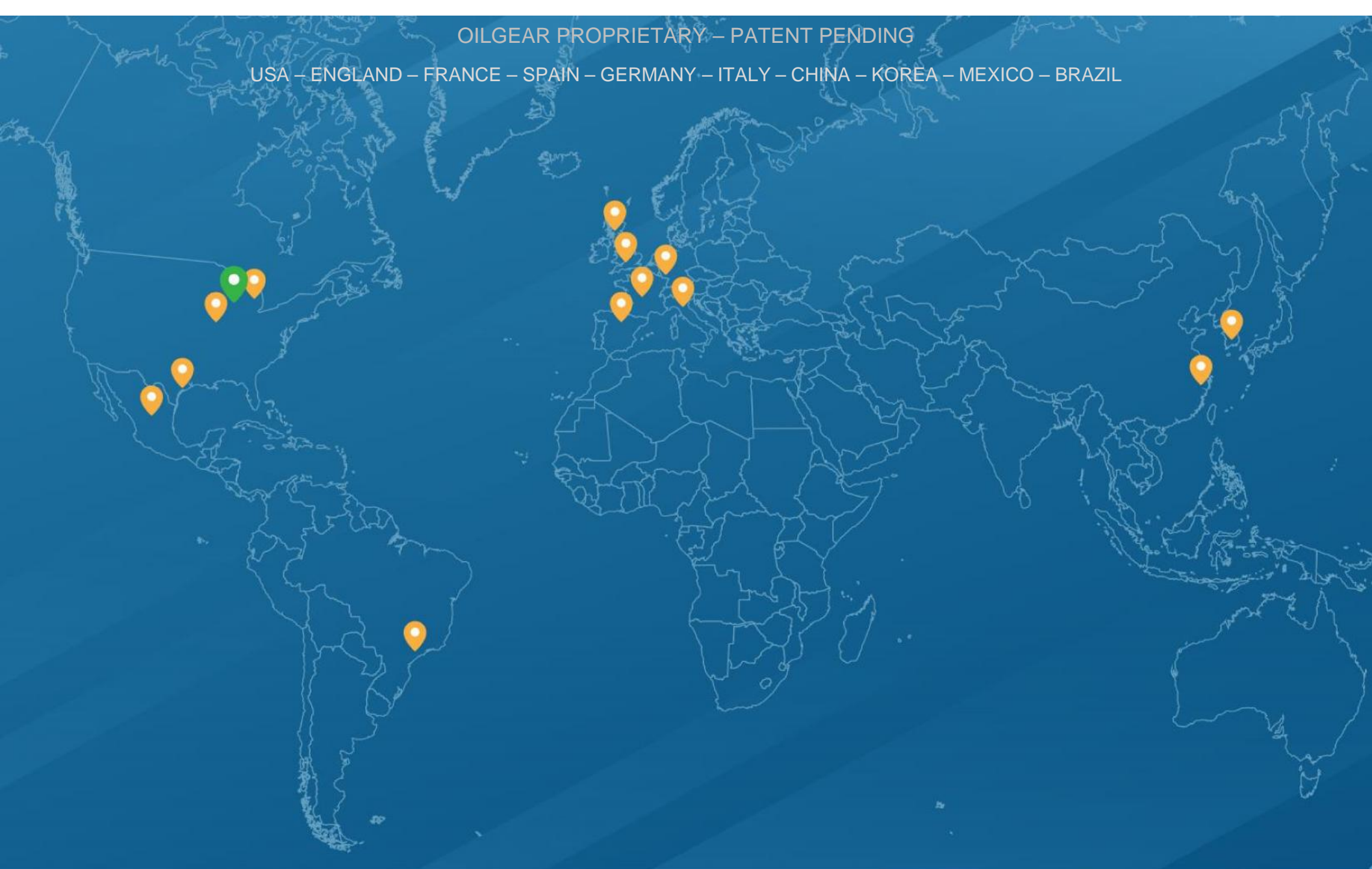
These calculations use actual rig data

Quantity of 160 Gallon Accumulators Needed		
Water Depth (ft)	Accumulator Charge Pressure	
	5000 psig (No BARS™)	7500 psig (With BARS™)
6000	14	6
7000	15	6
8000	17	7
9000	19	7
10000	21	8
11000	23	9
12000	24	9

~60% fewer accumulators

OILGEAR PROPRIETARY – PATENT PENDING

USA – ENGLAND – FRANCE – SPAIN – GERMANY – ITALY – CHINA – KOREA – MEXICO – BRAZIL



THANK YOU

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