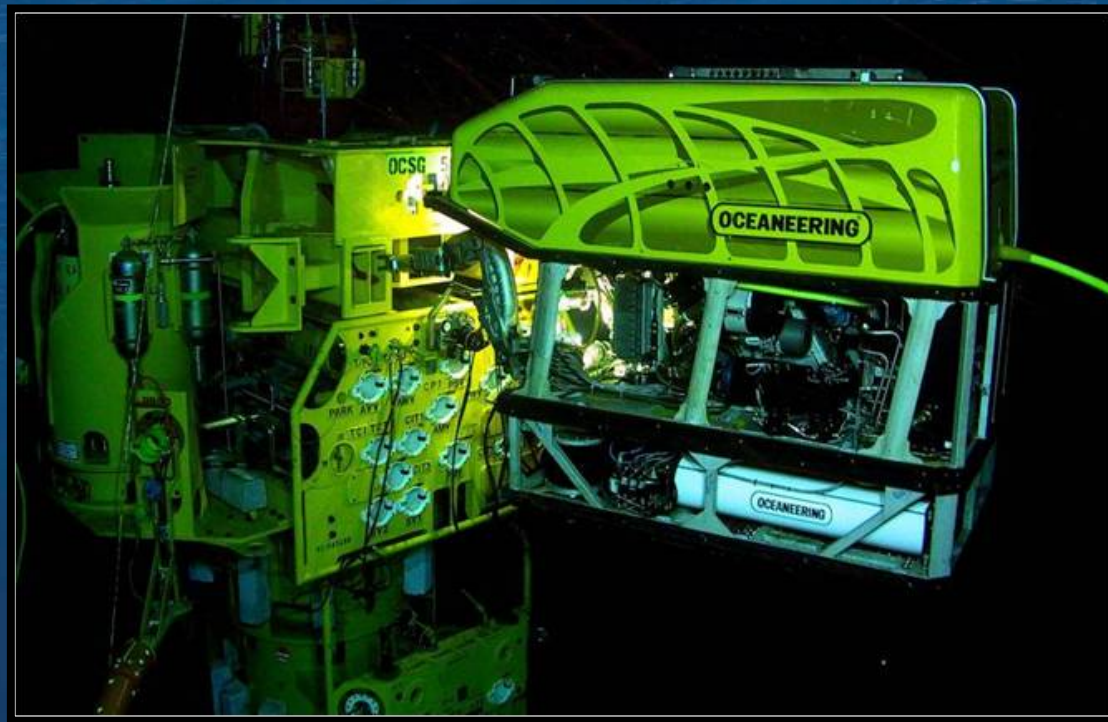


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**BOP ROV Intervention Methods –
lessons learned as result of Horizon**



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Standards For ROV Intervention

- Standards for ROV Interfaces
- Standards for ROV Pumping Capabilities
- Standards for Auxiliary Volume

Standards For ROV Interfaces

- Currently no standard for ROV Intervention interfaces
- Flow paths are restricted with current configurations:
API 17D, 17H and ISO13628-8
- New API 17H, API 16D and RP 53 will identify standard for ROV BOP Intervention
- Once implemented, flow path will accommodate API recommended minimum closing times

Standards For ROV Interfaces (Current)



Standards For ROV Interfaces (Recommended API 17H Hi Flow)

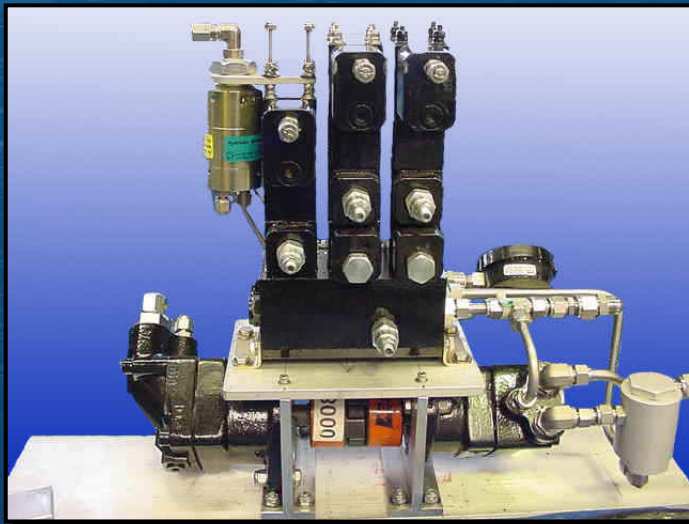


Standards For ROV Pumping Capabilities

- Current requirement is that ROV provide a means of pumping saltwater in an emergency
- No Maximum or Minimum Flow Requirement
- Depending on BOP Valve type or Configuration flows in excess of 7 gpm are required.
- Testing currently done with Hot Line with Stab
- Per new regulations, testing must be performed with ROV

Standards For ROV Interfaces (Current)

- Pump types and flows vary (.5 gpm to 3.5 gpm)
- No stored volume for BOP testing subsea



Standards For ROV Interfaces

(IADC Recommended BOP Intervention Skid)

- 10 gpm @ 3000 psi continuous and capability to 5000 psi
- Volume to override (1) Ram function subsea for testing
- Skid based system-10gpm @ 3000 psi w/ 5000 psi, 64 gallons of control fluid and fits ROV of opportunity

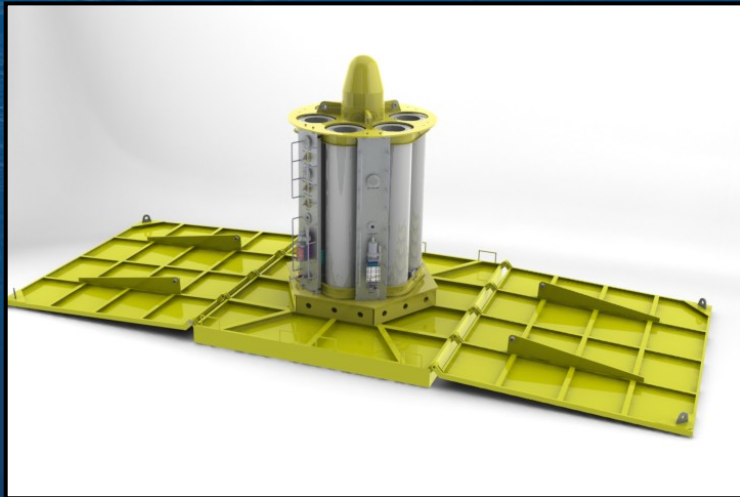


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Standards For Accumulated Volume

- Currently no means of supplying large volumes
- Isolation required for all stack accumulators
- Allows means of operating stack to API closing times
- Rechargeable subsea
- ANY ROV of opportunity can operate

Standards For Accumulated Volume



Oceaneering International, Inc.

Contact:

Houston, Texas.: 832-467-7600

John Davis: 832-467-7930

jdavis@oceaneering.com



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