JANUARY 2011 SANDFACE COMPLETIONS GUIDE

Sand Exclusion Devices, ICD Products and Suppliers plus Sandface Completions and Gravel/Proppant Data

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CAND CONTROL DRODUCTS OF ASSISTED BY MANUFACTURED AND BY TYPE OF DESIGN

		Screen/Product Type					
to		Wire- Pre- Shrouded Inflow					Inflow Contro
y	Supplier / Product Trade Name	Wrapped		Metal Mesh	Expandable	Other	Device
	ABSOLUTE COMPLETION TECHNOLOGIES www.ab	x	m				
	FACSRITE*					BPI	
	FLUXRITE ICD						P/I
	MESHRITE*			X			
	PACKRITE PREMIUM PORT 3 ICD		Х				P/I
	ALLOY SCREEN WORKS www.alloyscreenworks.	com					P/I
ı	ASW ALPHA ROD BASE	X					
	ASW DUAL PRE-PACK AND DUAL PRE-PACK/TT		Х				
	ASW DUAL PRE-PACK/SC		Х				
	ASW PIONEER AND PIONEER/TT ASW SAND-BAR	Х		Х			
	ASW WILDCATTER ALL-WELDED WRAP-ON	Х		^			
	ANTONOIL www.antonoil.com						
	PRECISE MICRO COMPOSITE			Х			
	PRECISE PUNCHED SLOT					PSS	
	PRECISE GRAVEL PRE-PACK		Х				D.(1
	INFLOW CONTROL SCREEN ICD	a interest					P/I
	BAKER HUGHES www.bakerhughes.com/sandc BAKERWELD	X					T
	BAKERWRAPXP	X					
	EQUALIZER HELIX ICD						P/I
	EQUALIZER SELECT ICD						P/I
	EXCLUDER2000 AND EXCLUDERDB			Х			
	EXPRESS SELECTAFLOW II AND SELECTAFLOW MST				BPE	FCS	
	SHAPE MEMORY POLYMER					SMP	
	SLIM-PAKXP		X			J.111	
1	XPFRAC					BPI	
	DELTA SCREENS www.deltascreens.com						
	DELTA DIRECT WRAP-ON	Х					
	DELTA ELITE DELTA PAK		Х	X			
	DELTA WELD	Х	^				
ı	G&L SLOTCO www.gl-slotco.com	<u> </u>					
;	SLOTTED LINERS					SL	
	HALLIBURTON www.halliburton.com						
	ALL-WELD	Х					
	ENHANCED LOW-PROFILE		Х				D.(1
	EQUIFLOW ICD PETROGUARD ADVANCED MESH			X			P/I
	PETROGUARD MESH			X			
	PETROGUARD SWELL				SFE		
)	PETROGUARD WRAP (DIRECT WRAP)	Х					
	POROMAX PREMIUM LOW-PROFILE		X	Х			
	REGENT ENERGY GROUP www.regentenergygrou	ın com					
	REGENT SLOTTING	10.00111				SL	1
	SCHLUMBERGER www.slb.com/transcend						
ī	ENDURE/ASSURE			X			
	EXTRACTOR	Х					
	FACSRITE*					BPI	
	LINESLOT/LITESLOT DIRECT WRAP	X		V			
	MESHRITE* PACKRITE		X	Х			
	RESFLOW ICD						P
	RESINJECT ICD						l l
	TEJAS COMPLETION SOLUTIONS www.tejascs.com						
	TCS ICD						P/I
				Х			P/I
; ;	TRU-MESH TRU-WELD	Х		A			
	TRU-WRAP	X					
	TUBULAR PERFORATING MANUFACTURING www.t	pmltd.com		v			
	UNISCREEN VARIPERM www.variperm.com			Х			
3	WEDGE WIRE 904		Х				
	WIRE WRAPPED PRE-PACKED 906		X				
	WIRE WRAPPED THIN-PACKED 907	Х					
	WEATHERFORD www.weatherford.com						
	DURA-GRIP DIRECT WRAP	Х					
	ESS				BPE		
	EVOELELO			Х			P/I
2	EXCELFLO			X			F/I
	FLOREG ICD						1
2			Х	^			
2	FLOREG ICD MAXFLO	X	X	A			
2	FLOREG ICD MAXFLO MICRO-PAK	X X X	Х	^			



OPEN HOLE SANDFACE COMPLETION DESIGN FLOW CHART*

Gather representative formation sand and

shale samples for testing.

Well screen design optimization,

 $d_{10}/d_{95} < 10$

 $d_{40}/d_{90} < 5$

Sub 44 microns < 5%

Well life and erosion velocity (flux rate) exceeds risk tolerance, or future

water/gas shut off

required.

Screen only completion

w/shrouded metal mesh screen; can be open hole or cased and

perforated. If $d_{40}/d_{90} < 3$ and sub

44 micron < 2%, consider

pre-pack screens. Consider wire

wrap screens, if $d_{50} > 100$

microns.

screen mesh and gravel size

screen evaluation test

fines migration test

PSD analysis



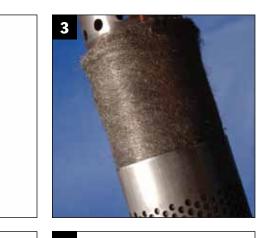






SAND CONTROL PRODUCTS





Will inhibitive WBM

control reactive shale?

test inhibitive brines –

halides, formates, etc.

test glycol additives

Reactive shale is present?

k > 1 Darcy

Screen only completion

w/shrouded metal mesh

screen; can be open hole or

ECD=Equivalent Circulating Density OBM=Oil Base Mud

*Courtesy of Rick Dickerson at Chevron Energy Technology Company, Drilling and Completions Technology Department, Houston, Texas **Grain size selection criteria is based on SPE 39437

cased and perforated.

DIF=Drill-In Fluid

GP=Gravel Pack

ES=Expandable Screen



Drill w/OBM, displace w/brine or

OBM or WBM, can perform

constrained). Can also use

alpha/beta wave GP (run PDL if

shale reactivity w/WBM is time

alternate path or ES technology.

Does T&D model

indicate screens

can reach TD with WBM?

Drill w/WBM. Can perform

use alternate path or ES

fluid type and chemistry

clean-up chemistry, pills,

•filter cake tests: lift-off

hole cleaning hydraulics (ECD)

SF=Solid Free

T&D=Torque and Drag

RMA=Rock Mechanics Algorithm

and compatibility

pressure, return k

technology.

Design DIF

ABBREVIATION KEY

PDL=Pre-Drilled Liner

OHGP=Open Hole Gravel Pack TD=Total Depth

k=Permeability

IWC=Intelligent Well Completions PSD=Particle Size Distribution WBM=Water Base Mud

•fluid density

alpha/beta GP, if ECD's don't

exceed frac window. Can also

SF (solid free) or conditioned





Testing in addition to

previous well screen

•T&D modeling to confirm

•T&D modeling to confirm

expansion tool can reach

additional screen collapse

evaluate zonal isolation

Recycle – change one or

Is the above T&D and

screen collapse

modeling compatible

with ES design?

ES design is complete; write

operational procedure.

more of the parameters

and re-design.

methods

screens can reach TD

List of primary drivers for ES, but not

drill cuttings collection and disposal

acceptable well life and reliability risk

Will sand

control method

be GP or ES?

GP

beta breaker design, if needed

alternate path design including

Is proposed lateral

length, frac gradient, and

well azimuth/location compatible

with GP design as determined

by GP simulator?

OHGP design is complete;

write operational procedure.

for alpha/beta wave GP

friction test, if needed

•run gravel pack simulation

Gravel pack design determine frac gradient

a requirement for application

• open hole size < 8.5 in.

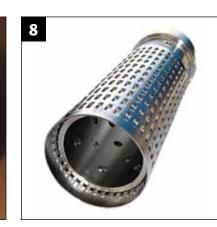
sometimes lower cost

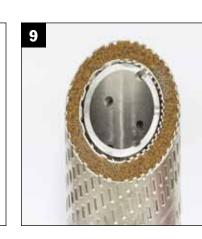
•larger ID (allows for IWC)

logistically simpler

required

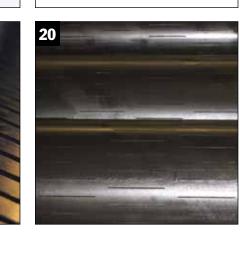














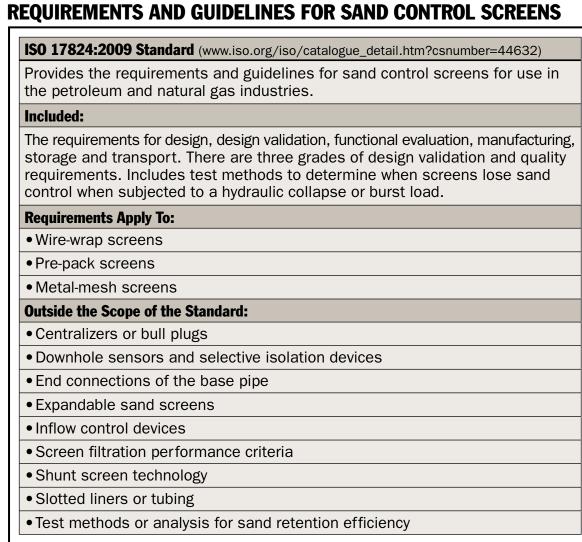
SAND CONTROL ENGINEERED TO BE

THIS RELIABLE.

VARIPERM.COM

COMMON WOVEN MESH LISED IN SUROLIDED SAND SCREENS

Micron Rating	Weave Type	Weave Count	Thickness (in./mm)		
85-110	Plain Dutch Weave	30 x 150	0.023/0.59		
125-145	Plain Dutch Weave	24 x 110	0.034/0.87		
175-225	Twill Dutch Weave	18 x 210	0.037/0.95		
260-315	Reverse Twill Dutch Weave	132 x 16	0.046/1.16		
280-330	Plain Dutch Weave	12 x 64	0.05/1.44		
Plain Dutch	Weave Twill Dutch W	/eave Reverse T	will Dutch Weave		
NOTES: Plain Dutch Weave: woven in plain over under pattern of weft wires (warp wires are typically heavier and larger in diameter than weft wires). Twill Weave: similar to Plain Dutch Weave except woven in a twill style over 2 wires and under 2 wires. Reverse Weave: warp and weft wires are reversed.					



Class	Туре	Examples
Natural	Sand	Ottawa, Jordan, England, Brady, etc.—SG 2.65
Natural Modified	Sand	Resin-coated, curable (sand flowback problems) and pre-cured (enhanced strength)—SG 2.60
Man-made Materials	Ceramics, modified ceramics and non-ceramics	Ultra-light weight (ULWP)—SG < 2.0 Light weight (LWP)—SG 2.70 Intermediate (ISP)—SG 3.20
Natural Modified	High-strength aluminum oxide	Sintered Bauxite (strongest)—SG 3.49

SCREEN GALIGE LISED WITH VARIOUS GRAVEL /PROPPANT

REEN GAUGE USED WITH VARIOUS GRAVEL/PROPPANT				
Gravel Size (US Mesh)	Gravel Size (in.)	Screen Opening (in.) (micron)	Screen Gauge	
40/60	0.0165 - 0.0098	0.008 ~200	8	
30/50	0.0230 - 0.0120	0.010 ~250	10	
20/40	0.0330 - 0.0165	0.012 ~300	12	
16/30	0.0470 - 0.0230	0.016 ~400	16	
12/20	0.0660 - 0.0330	0.020 ~500	20	
8/12	0.0940 - 0.0470	0.028 ~700	28	

ISO 1792/	1.2000 Standard (www.ice.org/ice./estalogue.detail.htm2conumber_44622)
	l:2009 Standard (www.iso.org/iso/catalogue_detail.htm?csnumber=44632)
	the requirements and guidelines for sand control screens for use in leum and natural gas industries.
Included:	
storage a requireme	ements for design, design validation, functional evaluation, manufacturing nd transport. There are three grades of design validation and quality ents. Includes test methods to determine when screens lose sand then subjected to a hydraulic collapse or burst load.
Requireme	ents Apply To:
• Wire-wra	ap screens
• Pre-pack	< screens
• Metal-m	esh screens
Outside th	e Scope of the Standard:
• Centrali:	zers or bull plugs
• Downho	le sensors and selective isolation devices
• End con	nections of the base pipe
• Expanda	able sand screens
• Inflow co	ontrol devices
• Screen	filtration performance criteria
• Shunt s	creen technology
• Slotted	liners or tubing
• Test me	thods or analysis for sand retention efficiency

TYPES OF GRAVEI /PROPPANT

Gravel Size (in.)	Screen Opening (in.) (micron)	Screen Gauge
0.0165 - 0.0098	0.008 ~200	8
0.0230 - 0.0120	0.010 ~250	10
0.0330 - 0.0165	0.012 ~300	12
0.0470 - 0.0230	0.016 ~400	16
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0.0940 - 0.0470	0.028 ~700	28
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*Facsrite and Meshrite are exclusive to Schlumberger.

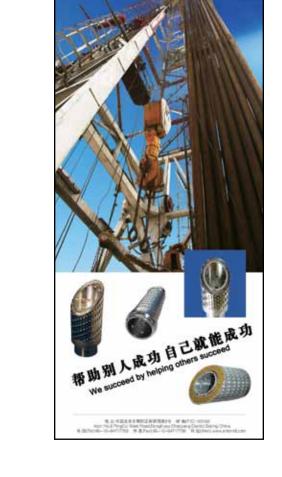


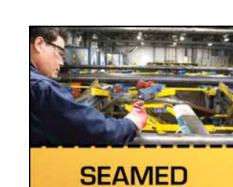












SLOTTED LINER

The field-proven

sand control solution

Engineered

Economical

regentenergygroup.com

REGENT

GROUP

Optimized