JANUARY 2014 SANDFACE COMPLETIONS GUIDE

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

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SAND CONTROL PRODUCTS CLASSIFIED BY MANUFACTURER AND BY TYPE OF DESIGN

oto ey	Supplier / Product Trade Name	Wire- Wrapped	Pre- Packed	Shrouded Metal Mesh	Product Type Expandable	Other	Inflow Contro
,	3M PETROCERAM www.petroceram.com	ттарроа	Tuonou	I I I I I I I I I I I I I I I I I I I	<u> </u>		201100
1	PETROCERAM AND PETROCERAM TT ALLOY SCREEN WORKS www.alloyscreenworks.co) om				CSS	
	ASW ALPHA ROD BASE	X					
2	ASW DUAL PRE-PACK AND DUAL PRE-PACK/TT ASW DUAL PRE-PACK/SC		X				
3	ASW PIONEER AND PIONEER/TT	Х					
4	ASW SAND-BAR ASW SLOTTED LINERS			X		SL	
	ASW WILDCATTER ALL-WELDED WRAP-ON	X					
	BAKER HUGHES www.bakerhughes.com BAKERWELD	X					
	BAKERWRAPXP	X					
5	EQUALIZER HELIX ICD EQUALIZER SELECT ICD						P/I P/I
6	EXCLUDER2000			Х			P/I
7	EXPRESS GEOFORM				BPE	SMP	
	SELECTAFLOW II AND SELECTAFLOW III	X				SIVIP	
	SLIM-PAK CON.SLOT 2.0 OIL & GAS SCREENS GmbH www.cc	no alat da	Х				
8	FORMATIONLINK	n-siot.de X					
9	FORMATIONLINK CERAMIC-COATED SCREEN	Х					
	DELTA SCREENS www.deltascreens.com DELTA DIRECT WRAP-ON	X					
.0	DELTAELITE	Α		X			
.1	DELTAPAK DELTAPORE HP THRU TUBING		X	X			
.2	DELTAWELD	X		^			
	HALLIBURTON www.halliburton.com	V		1			I
	ALL-WELD ENHANCED LOW-PROFILE	X	Х				
.3	EQUIFLOW AUTONOMOUS ICD						P/I
	EQUIFLOW ICD PETROGUARD ADVANCED MESH			X			P/I
.4	PETROGUARD MESH DS (DUAL SHROUD)	V		Х			
.5	PETROGUARD MODULAR SCREEN PETROGUARD SHUNT SYSTEM	X		X			
	PETROGUARD SWELL				SFE		
	PETROGUARD WRAP (DIRECT WRAP) POROMAX	X		X			
	PREMIUM LOW-PROFILE		Х				
	H.P. WELL SCREEN www.hpwellscreen.com AICV						Р
.6	HP SLOTTED LINER					SL	•
	MESHLOCK POROBOND			X			
.7	POROLOCK			X			
.8	QFLUX SANDFREE	X					P/I
	SOLIDWRAP	X					
	SLIMPACK REGENT ENERGY GROUP www.regentenergygroup	nom	X				
	PREMIUM TRS SLOTTED LINERS	COIII				SL	P/I
.9 20	PREPACKED SLOTTED LINERS					SL SL	P/I
:U	SLOTTED LINERS SCHLUMBERGER www.slb.com/transcend, www.a	l absolutect.c	om			- SL	P/I
	ACCURITE	X					
21	ENDURE / ASSURE EXTRACTOR WIRE WRAP	X		X			
2	TRI-D FACSRITE*					PMD	
	TRI-D FACSWAX* LINESLOT / DOMINATOR DIRECT WRAP	X				WPMD	
	LINESLOT HIGH RATE GAS	X					
23	MESHFLUX ICD MESHRITE*			X			P/I
	PREMIUM PORT 3 ICD						P/I
25	PACKRITE RESFLOW ICD		X				P
26	RESINJECT ICD						ı
	TRI-D DIRECTRITE* SUPERIOR ENERGY SERVICES www.superiorenerg	v com		X			
	COILFLO DB (DIFFUSION BONDED)	,y.com		Х		TT	
·7	DYNAFLO DB (DIFFUSION BONDED) ECONOFLO			X		SC	
	PROWELD	X		^		36	
	PROWELD TOP (TIGHT ON PIPE) SLIMFLO	Х	Х				
28	SUREFLO		^	X		SC	
	UNIFLO ROI TIBUL AD DEDECRATING MANUEACTURING WARM TO	amital acre					Х
29	TUBULAR PERFORATING MANUFACTURING www.tp UNISCREEN	Jiiila.com		X			
	WEATHERFORD www.weatherford.com						
0	ESS FLOREG ICD				BPE		P/I
	MAXFLO			Х			1/1
1	MAXFLO-BL MAZEFLO	V		X		CMC	
	MICRO-PAK	X	Х			SMS	
2	ULTRAFLO SLIP-ON JACKET	X					
2	ULTRA-GRIP DIRECT WRAP ULTRAWELD SLIP-ON JACKET	X					



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 $d_{50} > 100$

screen mesh and gravel size

screen evaluation test

fines migration test

PSD analysis



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GUIDELINES FOR SAND CONTROL SCREENS

This standard provides the requirements and guidelines for sand control screens for use in the petroleum

industry. It covers the requirements for design, design

determine when wire-wrap, pre-pack and metal-mesh

screens lose sand control when subjected to a hydraulic

validation, functional evaluation, manufacturing, storage and transport. It includes test methods to

*www.iso.org/iso/catalogue_detail.htm?csnumber=44632

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

more of the parameters

Is the above T&D and

screen collapse

modeling compatible

with ES design?

ES design is complete; write

operational procedure.

and re-design.

screens can reach TD

ISO 17824:2009 Standard*

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?

a requirement for application

• open hole size < 8.5 in.

sometimes lower cost

•larger ID (allows for IWC)

Gravel pack design

determine frac gradient

for alpha/beta wave GP

friction test, if needed

run gravel pack simulation

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

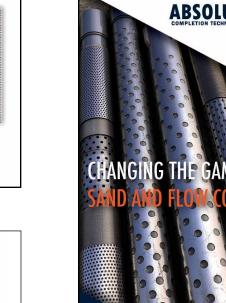
by GP simulator?

OHGP design is complete;

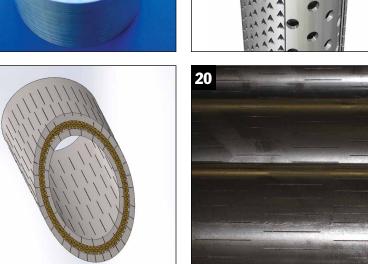
write operational procedure.

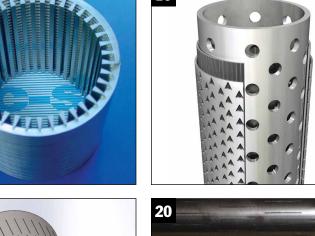
logistically simpler

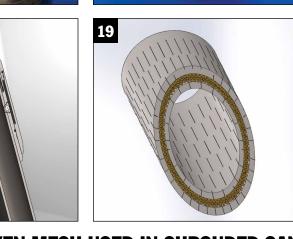


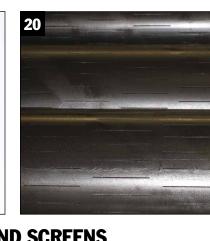


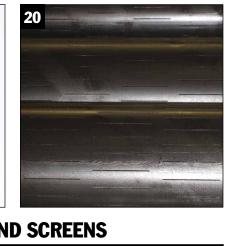




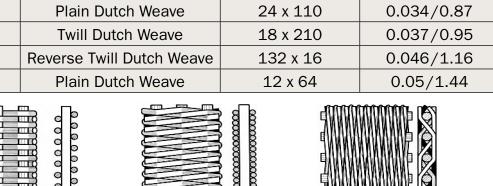












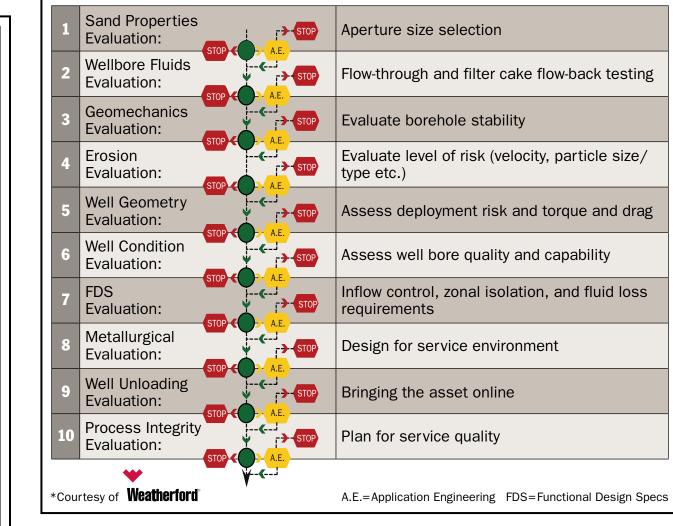
and larger in diameter than weft wires). **Twill Weave:** similar to Plain Dutch Weave except woven in a twill style over 2 wires and under 2 wires. **Reverse Weave:** warp and weft wires are reversed.

COMMON WOVEN MESH USED IN SHROUDED SAND SCREENS

Micron Rating

85-110	Plain Du	itch Weave	30 x 150	0.023/0.59
25-145	Plain Du	itch Weave	24 x 110	0.034/0.87
75-225	Twill Du	tch Weave	18 x 210	0.037/0.95
260-315	Reverse Twi	II Dutch Weave	132 x 16	0.046/1.16
280-330	Plain Du	itch Weave	12 x 64	0.05/1.44
Plain Dutch	o o o o o o o o o o o o o o o o o o o	Twill Dutch W	deave Reverse 1	will Dutch Weave
	eave: woven in pla	•	n of weft wires (warp wires	are typically heavier

10 STEPS TO SAND CONTROL SYSTEM SELECTION*



TYPES OF GRAVEL/PROPPANT

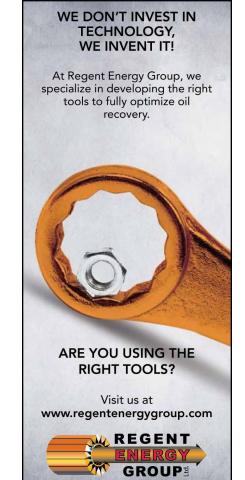
Class	Туре	Examples		
Natural	Sand	Ottawa, Jordan, England, Brady, etc.—SG 2.65		
Natural Modified	Sand	Resin-coated, curable (sand flowback problems) and pre-cured (enhanced strength)—SG 2.60		
Man-made Materials	Ceramics, modified ceramics and non-ceramics	Ultra-light weight (ULWP)—SG < 2.0 Light weight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

SCREEN GAUGE USED WITH VARIOUS GRAVEL/PROPPANT

Gravel Size	Gravel Size	Screen	Screen Opening		
(US Mesh)	(in.)	(in.)	(micron)	Gauge	
40/60	0.0165 - 0.0098	0.006	150	6*	
30/50	0.0234 - 0.0117	0.008	200	8	
20/40	0.0331 - 0.0165	0.012	300	12	
16/30	0.0469 - 0.0234	0.016	400	16	
12/20	0.0661 - 0.0331	0.020	500	20	
8/12	0.0937 - 0.0661	0.038	950	38	



www.con-slot.do Stabilised producing condition 'HEAVY DUTY' od Based Wire Wrapped Screen



An Enhanced Oil Recovery Compar





Drill w/OBM, displace w/brine or

OBM or WBM, can perform

constrained). Can also use

alpha/beta wave GP (run PDL i

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

•filter cake tests: lift-off

and compatibility

pressure, return k

clean-up chemistry, pills,

hole cleaning hydraulics (ECD)

SF=Solid Free

T&D=Torque and Drag

RMA=Rock Mechanics Algorithm

technology.

Design DIF

ABBREVIATION KEY

OHGP=Open Hole Gravel Pack TD=Total Depth

k=Permeability

PDL=Pre-Drilled Liner

BAKER

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

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

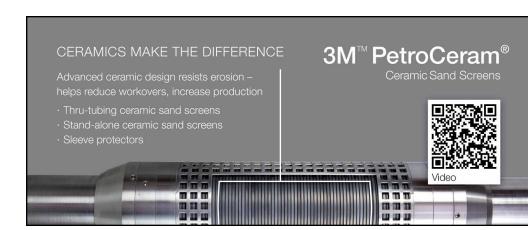
screen; can be open hole or

cased and perforated.

ECD=Equivalent Circulating Density OBM=Oil Base Mud

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









Tri-D FacsRite, Tri-D FacsWax, Tri-D DirectRite and MeshRite are patented by Absolute Completion Technologies.





DIF=Drill-In Fluid

ES=Expandable Screen