Mi SWACO
A Schlumberger Company

HDD Mining and Waterwell

Product listing and applications

Wherever you're working, our HDD Mining and Waterwell specialists have you covered

Where do your projects take you? Into mines hundreds of feet below the earth or coring jobs at the surface? Tunneling beneath rivers or under major highways? Conducting curb-to-house installations or drilling for coalbed methane reserves?

Wherever you work, you can depend on M-I SWACO HDD Mining and Waterwell specialists to keep your projects on target. As the industry-leading provider of drilling fluid systems and additives, solids control equipment, and engineering services, we have the know-how and resources to custom-design solutions that meet the unique requirements of your project, regardless of its location or complexity. Our highly trained drilling fluid specialists have worldwide experience in delivering 24-h, onsite engineering services that no competitor can match. As an operating group of M-I SWACO, HDD Mining and Waterwell provides drilling fluids, solids control, and drilling waste management equipment and services.

Total-package solutions

- Complete prebore planning, including mud programs, logistics, and engineering
- A complete line of drilling fluids and additives from a company with decades of worldwide experience
- Solids control equipment and shaker screens from the same fluids company
- Customized solutions engineered for individual projects

Advantages

- Fewer unscheduled problems that can result in costly delays and accidents
- Effective fluids solutions that save time and materials
- Reduced logistics problems and associated costs
- Optimal benefit and greater efficiency from both fluids systems and solids control equipment

Our solids control and recycling equipment and services keep your project and bottom line under control.

As a part of M-I SWACO, we can provide a wide variety of linear and balanced elliptical motion shakers, mud cleaners, desanders, desilters, and centrifuges, each of which can be tailored for your requirements from recycling to dewatering drilling fluids. M-I SWACO HDD Mining and Waterwell specialists also provide, for sale or rent, unitized recycling systems capable of cleaning drilling fluids at rates of 150–1,000 galUS/min [568–3,785 L/min]. In addition, we manufacture shaker screens that are compatible with every brand of solids control equipment in the industry.

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HDD Mining and Waterwell Products

Name	Description	Primary Application				Typical Concentration†		
		HDD Products	Mining Products	Waterwell Products	NSF-Certified Products	lbm/100 galUS	lbm/bbl	kg/m³
DRILPLEX HDD viscosifier	A specialty product used to enhance the gel strengths of MAX GEL* viscosifier, DRILPLEX HDD* viscosifier is an inorganic chemical viscosifier for water-base, bentonite drilling fluids	■	■	■	■	10:1 ratio with MAX GEL viscosifier		
DUO-TEC viscosifier	Dispersible, non clarified technical-grade xanthan gum that provides viscosity, including low-shear-rate viscosity and suspension for all water-based mud systems	■				0.5–2	0.25–1	0.7–2.75
DUO-VIS and SUPER-VIS biopolymer	Xanthan gum that is a high-molecular-weight biopolymer used for increasing carrying capacity in water-based systems	■				0.5–2	0.25–1	0.7–2.75
FLO-PLEX additive	A fluid-loss-control agent that is a polysaccharide derivative used to control filtration in the DRILPLEX* mixed metal oxide water-based drilling fluid system at recommended concentrations	■	■			2–4.5	0.75–2	2–6
M-I GEL SUPREME nontreated bentonite	A viscosifier that is a premium-grade Wyoming bentonite (a sodium montmorillonite clay) which has not been chemically treated				■	20–50	8.5–20	25–55
KLA-GARD system	A shale stabilizer that reduces the swelling of sensitive shales and drill cuttings exposed to water-based drilling fluids	■	■			0.75 – 2 galUS/100 galUS		7.5–20 L/m³
KWIK PLUG MEDIUM agent	Screen-sized bentonite chips which are used to seal and plug earthen boreholes		■	■	■	See product data sheet		
Lost Circulation Materials	Cedar fiber, mica, drilling paper, cottonseed hulls, and FED-SEAL lost circulation material	■	■			See product data sheet		
MAX BORE HDD system	A proprietary, blended, high-yielding Wyoming bentonite supplied as a single-sack product used especially in boring-fluid applications	■				20–30	8–12	20–35
MAX GEL viscosifier	A premium 220-bbl–yield Wyoming bentonite blended with special extenders that yields more quickly than regular API-grade bentonite	■	■	■	■	15–30	6–12	15–35
PLATINUM D-D blend	An aqueous blend of surface-active agents, it is designed to reduce the surface tension of all water-based mud systems and reduce the sticking tendency of water-sensitive shale cuttings	■				1–4 quart/100 galUS		2.5–10 L/m³
PLATINUM FOAM PLUS agent	A water-soluble and biodegradable foaming agent	■	■	■	■	1–4 quart/100 galUS		2.5–10 L/m³
PLATINUM PAC polymer	A polyanionic cellulose that is a readily dispersible, water-soluble polymer designed to control fluid loss in water-based muds	■	■	■	■	0.5–2	0.25–1	0.75–2.75
PLATINUM PAC UL polymer	A polyanionic cellulose that is a readily dispersible, water-soluble polymer designed to control fluid loss in water-based muds with minimal viscosity increase	■	■	■	■	0.5–4	0.25–1.5	0.75–4
POLYPAC R additive	A polyanionic cellulose, high-quality, water-soluble polymer designed to control fluid loss in water-based muds	■	■	■		0.5–2	0.25–1	0.75–2.75
POLYPAC UL cellulose	A polyanionic cellulose, high-quality, water-soluble polymer designed to control fluid loss in water-based muds with minimal viscosity increase	■	■	■		0.5–4	0.25–1.5	0.75–4
POLY-PLUS inhibitor	This polymer is a high-molecular-weight, anionic liquid designed encapsulate cuttings and stabilize shale	■		■	■	1–4 quart/100 galUS		2.5–10 L/m³
POLY-PLUS 2000 inhibitor	A high-molecular-weight anionic polymer that comes as a water-free, high-solids dispersion for excellent cuttings encapsulation and shale stabilization		■		■	0.5–1 quart/100 galUS		1.5–2.5 L/m³
POLY-PLUS EHV inhibitor	An inhibitor of very high-molecular-weight, anionic PHPA dry granular powder for use in mineral exploration and construction		■		■	0.5–1	0.25–0.5	0.75–1.4
POLY-PLUS RD inhibitor	An inhibitor (PHPA) that is readily dispersible and used for cuttings encapsulation and shale stabilization	■	■			0.5–2	0.25–1	0.75–2.5
POLYSWELL copolymer	A copolymer that expands to 200 times its volume in freshwater for use in controlling lost circulation	■	■			As required		
RINGFREE thinner	A highly efficient, thermally stable polymer thinner that also removes clays from the drillstring and helps to break up clay balls	■	■	■	■	0.5–1 quart/100 galUS		1.5–2.5 L/m³
ROD COAT L 1000 grease	A high-performance lithium salt base drill-rod grease reduces rod vibration		■			As required		
ROD EASE lubricant	A superior lubricant for HDD, coring, and rotary drilling applications	■	■			0.5–2 quart/100 galUS		1.5–5 L/m³
SMOOTH GROUT 30 grout	An easy-to-use bentonite-grouting composition that when mixed properly, provides a 30% solids pumpable slurry for sealing boreholes		■	■	■	See product data sheet		
TACKLE additive	A liquid polymer that is a low-molecular-weight, anionic thinner designed to deflocculate a wide range of water-based drilling fluids		■		■	0.5–1 quart/100 galUS		1.5–2.5 L/m³

† Actual concentration will depend on the formations encountered.

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HDD Mining and Waterwell Products

DRILPLEX HDD

Viscosifier

Certified to NSF/ANSI 60

Advantages

- High ROP
- Optimal cuttings transport
- Excellent solids suspension
- Borehole stabilization
- Low drilling costs

Limitations

DRILPLEX HDD viscosifier may be adversely affected by anionic polymers or thinners. DRILPLEX HDD viscosifier should only be used to enhance a bentonite-based fluid. The mixing tank must be clean before being used.

Toxicity and handling

Bioassay information is available upon request. Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

DRILPLEX HDD* viscosifier comes in 25-lbm [11.3-kg] multiwall paper sacks with 80 sacks to a pallet.

Store in a dry location away from sources of heat or ignition and minimize dust.

Typical Physical Properties	
Physical appearance	Off-white powder
Odor	None
Specific gravity	2.3 to 3.1

A specialty product used to enhance the gel strengths of MAX GEL* viscosifier, DRILPLEX HDD viscosifier is an inorganic chemical viscosifier for water-based bentonite drilling fluids. DRILPLEX HDD viscosifier is only slightly soluble in water.

Applications

DRILPLEX HDD viscosifier allows the formulation of fluids with exceptional shear-thinning properties, resulting in a drilling fluid with both excellent dynamic and static carrying capacity for solids.

This is indicated by high yield point and low plastic viscosity readings. When not circulating, the mud instantly reverts to a gelled state and results in high suspending capacity indicated by high, nonprogressive gel-strength readings.

For 300 galUS [1,136 L] of drilling fluid mix:

- Add 1½ sacks (75 lbm [34 kg]) MAX GEL viscosifier in freshwater and hydrate for 10 min. If higher rheological properties are desired, mix more gel. For every 7 lbm [3.2 kg] of additional gel added, the yield point rises approximately 20 points.
- After the gel is hydrated, add 6 lbm [2.7 kg] of DRILPLEX HDD [3 vis cups] viscosifier and mix for an additional 5 to 10 min.
- For torque reduction, add 1.5 galUS [5.7 L] of ROD EASE* lubricant.

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DUO-TEC

Dispersible nonclarified xanthan gum viscosifier

Advantages

- Highly effective viscosifier
- Shear-thinning rheological profile for improved hydraulics
- Minimum frictional pressure losses for additional hydraulic horsepower at the bit and low high-shear-rate viscosity for maximum penetration rates
- Viscous laminar flow in the annulus for improved wellbore stability with maximum hole cleaning and suspension capacity
- Easy to mix

Limitations

- Trivalent ions such as chromium and iron can cause biopolymer precipitation and loss of viscosity or crosslinking
- Not tolerant of high-pH or high-calcium-ion conditions
- DUO-TEC* viscosifier should be pretreated with either sodium bicarbonate or sodium acid pyrophosphate (SAPP) and possibly citric acid prior to drilling cement
- Subject to bacterial degradation, a biocide should be used to prevent fermentation
- Slightly anionic nature of DUO-TEC viscosifier requires special mixing procedures when mixed with cationic materials

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

DUO-TEC viscosifier is a dispersible, nonclarified technical-grade xanthan gum that provides viscosity, including low-shear-rate viscosity, and weight-material suspension for all water-based mud systems. DUO-TEC viscosifier has the unique ability to produce a fluid that is highly shear-thinning and thixotropic.

Packaging and storage

DUO-TEC viscosifier is packaged in 25-lbm [11.3-kg] or 55.1-lbm [25-kg], plastic-lined, multwall paper sacks.

Store at room temperature in a dry, well-ventilated area. Keep in original container. Keep container closed. Store away from incompatibles.

Applications

The main function of DUO-TEC viscosifier is to increase viscosity for cuttings transport and suspension. DUO-TEC viscosifier performs effectively in all water-based fluids, from highly weighted to low-solids systems. This includes freshwater, seawater, saltwater, and heavy-brine systems.

DUO-TEC viscosifier works to provide an optimized rheological profile with elevated low-shear-rate viscosity and highly shear-thinning characteristics with low n values.

These characteristics frequently result in fluids with inverted flow properties, i.e., the yield point is greater than the plastic viscosity. Shear-thinning fluids have low effective viscosities at the high shear rates encountered inside the drillstring and at the bit. This low effective viscosity for minimal pressure losses and standpipe pressures helps optimize hydraulics and maximize rates of penetration.

Conversely, at the low shear rates experienced in the annulus, DUO-TEC viscosifier enables the fluid to have a high effective viscosity for adequately cleaning the well and suspending cuttings.

DUO-TEC viscosifier should be added slowly through the hopper to prevent lumping and minimize waste. It should be added at the rate of approximately one 25-lbm [11.3-kg] sack every seven minutes. The time required for the product to yield its ultimate viscosity depends on salinity, temperature, and shear.

The amount of DUO-TEC viscosifier required depends upon the desired viscosity. Normal concentrations range from 0.50–2.5 lbm/bbl [1.43–7.1 kg/m^3] for most mud systems. Special fluids and difficult hole cleaning conditions can require higher concentrations up to 4 lbm/bbl [11.4 kg/m^3].

The addition of salt, antioxidant, and thermal stabilizers improves temperature stability in DUO-TEC viscosifier-enhanced fluids from 250–280 degF [121–138 degC]. Specially formulated systems or pills have been used at temperatures up to 400 degF [204 degC].

Typical Physical Properties	
Physical appearance	Cream to tan powder
Specific gravity	1.5
Bulk density	50 lbm/ft^3 [800 kg/m^3]

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DUO-VIS and SUPER-VIS

Biopolymer viscosifier

Advantages

- Highly effective suspension enhancer; small treatments produce significant results
- Provides a shear-thinning rheological profile for improved hydraulics
- Minimum frictional pressure losses for additional hydraulic horsepower at the bit and low, high-shear-rate viscosity for maximum penetration rates
- Viscous laminar flow in the annulus for improved wellbore stability with maximum hole-cleaning and suspension capacity
- Easy to mix

Limitations

- Trivalent ions such as chromium and iron can cause biopolymer precipitation and loss of viscosity or cross-linking
- DUO-VIS* and SUPER-VIS* viscosifier should be pretreated with either sodium bicarbonate or SAPP, and possibly citric acid, prior to drilling cement
- Subject to bacterial degradation; a biocide should be used to prevent fermentation if used for prolonged periods
- Lightly anionic nature requires special mixing procedures when mixed with cationic materials

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Typical Physical Properties	
Physical appearance	Cream to tan powder
Specific gravity	1.5
Bulk density	50 lbm/ft³ [800 kg/m³]

DUO-VIS and SUPER-VIS viscosifier create an optimized rheological profile with elevated low-shear-rate viscosity and highly shear-thinning characteristics with low “n” values. Used for increasing carrying capacity in water-based systems. The system has the unique ability to produce a fluid that is highly shear-thinning and thixotropic.

Packaging and storage

DUO-VIS viscosifier is packaged in 25-lbm [11.3-kg] sacks.

SUPER-VIS viscosifier is packaged in 5-lbm buckets. The product can also be packaged in 2-lbm bottles (25 2-lbm bottles per box).

Store in a well-ventilated area away from sources of heat or ignition.

Applications

The main function of the DUO-VIS and SUPER-VIS biopolymer viscosifier is to increase low-shear viscosity for cuttings transport and suspension. This system performs effectively in all water-based fluids, from highly weighted to low-solids systems, including freshwater, seawater, salt, and heavy-brine systems.

The system works to provide an optimized rheological profile with elevated low-shear-rate viscosity and highly shear-thinning characteristics with low n values.

These characteristics frequently result in fluids with inverted flow properties, i.e., the yield point is greater than the plastic viscosity. Shear-thinning fluids have low effective viscosities at the high shear rates encountered inside the drillstring and at the bit. This low effective viscosity for minimal pressure losses and standpipe pressures allows optimized hydraulics and maximized rates of penetration.

Conversely, at the low shear rates experienced in the annulus, the system enables the fluid to have a high effective viscosity for adequately cleaning the well and suspending cuttings.

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FLO-PLEX

Primary fluid loss control additive

Advantages

- Optimally controls fluid loss for the DRILPLEX system
- Performs in other water-based systems
- Resists attack from bacteria
- Enables increased temperature limits to 300 degF [149 degC] by using thermal-extension additive

Limitations

- Water hardness must be removed
- Ineffective in high levels of magnesium

Toxicity and handling

Bioassay information is available upon request.

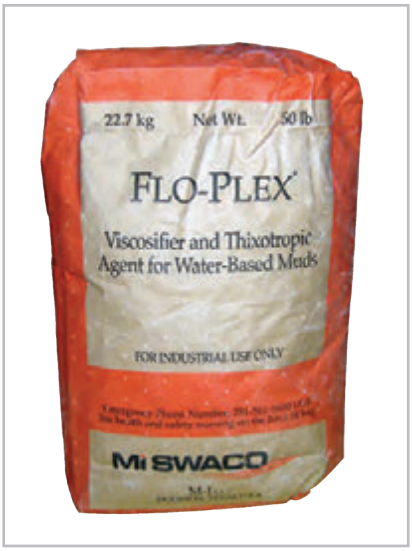
Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

FLO-PLEX* primary fluid loss control additive is packaged in 50-lbm [22.7-kg] multiwall paper sacks.

Store in a dry location away from sources of heat or ignition and minimize dust.

Typical Physical Properties	
Physical appearance	White powder
pH (4% water)	9.5–10.5
Solubility in water	Soluble
Bulk density	35–40 lbm/ft³ [560–640 kg/m³]



FLO-PLEX primary fluid loss control additive is a polysaccharide derivative used to control filtration in the DRILPLEX* mixed metal oxide water-based drilling fluid system at recommended concentrations. FLO-PLEX additive will not destroy the low-end rheology of the DRILPLEX system, as is commonly observed with conventional anionic fluid-loss-control agents such as carboxymethyl cellulose (CMC) and polyanionic cellulose (PAC).

FLO-PLEX additive is effective in seawater fluids, but all hardness should be treated before adding the FLO-PLEX additive.

FLO-PLEX additive may be used in any other type of fluid where starches and cellulosic additives are permitted.

The temperature stability of FLO-PLEX additive is about 250 degF [120 degC], but this may be extended to 300 degF [149 degC] by adding a thermal stability agent such as PTS-200* polymer temperature stabilizer.

FLO-PLEX additive is resistant to bacterial degradation.

Applications

Conventional anionic fluid-loss agents will thin the DRILPLEX system. Therefore, a separate additive was developed to provide fluid-loss control without lowering the yield-point value and breaking the cross-links. Because of its optimal design, FLO-PLEX additive, a polysaccharide derivative, is very effective in the DRILPLEX system.

When preparing new fluid, FLO-PLEX additive should be added at concentrations no less than 3.5 lbm/bbl [9.8 kg/m³], if fluid-loss control is required. Lower concentrations can cause loss of rheology. Treatment levels can be increased to 4.5–5 lbm/bbl [12.8–14.3 kg/m³] as required to maintain low filtration rates.

M-I GEL SUPREME

Nontreated bentonite

Certified to NSF/ANSI 60

Advantages

- Hydrates more than other types of clays and is best for generating viscosity, developing gels for suspension, and controlling filtration
- The premium-grade, API, untreated bentonite is considered more desirable for certain applications beause it has no chemical treatments
- The small particle size, unique flat shape, and high surface area of hydrated M-I GEL SUPREME* nontreated bentonite provide superior filtration characteristics
- Promotes the deposition of thin, compressible filtercakes in the wellbore

Limitations

Performance is reduced in salty (>5,000-mg/L C^{1-}) or hard (>240-mg/L Ca^{++}) waters due to decreased hydration.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

M-I GEL SUPREME viscosifier is packaged in 50-lbm (22.7-kg), multiwall paper sacks and is available in bulk. Minimize dust (use dustless systems for handling, storage, and cleanup).

Store in a dry location to minimize slip hazard when wet.

Typical Physical Properties	
Physical appearance	Light tan to gray-green powder
Specific gravity	2.3–2.6
Bulk density	48–52 lbm/ft³ [769–833 kg/m³]
ISO 13500 Clause 10 specifications: Suspension properties (suspension of 25 grams into 350 cm³ deionized water):	
Dispersed plastic viscosity	10 cP, min.
Yield point/plastic viscosity (YP/PV) ratio	1.5, max.
Dispersed API filtrate volume	2.5 cm³, max.

M-I GEL SUPREME bentonite viscosifier is a premium-grade Wyoming bentonite (sodium montmorillonite clay) that has not been chemically treated. It is used as a primary filtercake-building filtration-control and suspension agent in freshwater systems and has application in all water-based mud systems. M-I GEL SUPREME is a high-quality product that meets the API specification for non treated bentonite.

Applications

M-I GEL SUPREME bentonite is used to increase viscosity and reduce fluid loss in water-based drilling fluids.

It is a cost-effective product for achieving viscosity, controlling fluid loss, and maintaining filtercake quality in freshwater and seawater muds. Typical concentrations for M-I GEL SUPREME viscosifier range from 5 to 35 lbm/bbl [14.3 to 100 kg/m³]. As with all bentonite products, the yield decreases as salinity increases. In muds containing more than 10,000 mg/L chlorides, the performance of M-I GEL SUPREME bentonite is significantly reduced unless it is prehydrated in freshwater before adding it to the mud system.

Typical Amounts of GEL SUPREME Viscosifier Added to Freshwater			
Drilling application or desired result	**lbm/100 galUS**	**lbm/bbl**	**kg/m³**
Normal drilling	50–70	20–30	60–85
In gravel or other poorly consolidated formation	70–95	30–40	85–115
Lost-circulation control	105–130	45–55	125–155

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KLA-GARD

Shale stabilizer and inhibitor

Advantages

- Highly effective clay inhibitor
- Effective at all pH levels
- Environmentally acceptable
- Stable at temperatures in excess of 400 degF [204 degC]
- Reduces potential for bit balling
- Reduces the amount of dilution required and the associated treatment costs
- Unaffected by contaminants such as hard water, cement, or CO_2

Limitations

- Should not be added to systems containing high concentrations of active solids; flocculates muds with high methylene blue test (MBT) values, causing excessive viscosity
- Limits the hydration of all clay materials; therefore, bentonite additions must be prehydrated in freshwater
- Due to the interaction of KLA-GARD* shale stabilizer and inhibitor system with active solids and bentonite, give increased attention to filtration control
- Biodegradable; requires a biocide

Toxicity and handling

- Bioassay information is available upon request
- Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS

Typical Physical Properties	
Physical appearance	Clear blue liquid
Specific gravity	1.1
pH (1% solution)	6.5–8.5
Solubility in water at 68 degF [20 degC]	100%
Flash point, Pensky-Martens closed cup (PMCC)	>210 degF [99 degC]

KLA-GARD shale stabilizer and inhibitor reduces the swelling of sensitive shales and drill cuttings exposed to water-based drilling fluids. It inhibits shale hydration, reducing the effect of drill solids on viscosity, and it works to minimize problems such as excessive dilution rates, increased torque and drag, high surge and swab pressures, and bottomhole assembly balling.

This high-quality, concentrated product has applications in a wide variety of mud systems and has low toxicity characteristics suitable for consideration in offshore applications.

Applications

KLA-GARD inhibitor should be specified when additional inhibition is needed as an alternative to gyp, lime, and potassium systems. It can improve the inhibition of water-based fluids to a level that competes with oil-based muds for many applications.

Due to the powerful effect KLA-GARD inhibitor has on active solids, it should be added only to mud systems containing low concentrations of active solids, bentonite-free systems, or freshly prepared low-solids systems containing minimal prehydrated bentonite. These systems should have a methylene blue capacity of less than 12.5 lbm/bbl [35.6 kg/m^3] with 2–5 lbm/bbl [5.7–14.3 kg/m^3] of prehydrated bentonite for filtration control.

KLA-GARD inhibitor is compatible with most drilling fluid additives and is especially suited for use in freshly prepared, low-solids polymer systems such as the POLY-PLUS high-molecular-weight liquid clay inhibitor.

It is most effective when the use of organic thinners, such as SPERSENE* chrome lignosulfonate, is minimized.

Normal concentrations of KLA-GARD inhibitor range from 4 to 8 lbm/bbl [11.4 to 22.8 kg/m^3] depending on hole size, ROP, interval length, and reactivity of the shale. A minimum concentration of 4 lbm/bbl [11.4 kg/m^3] is required for the product to be effective. One lbm/bbl of KLA-GARD inhibitor contributes 508-mg/L chlorides; KLA-GARD inhibitor B, a chloride-free formulation, is available. To prevent bacterial attack, a biocide should be used.

KLA-GARD inhibitor works by being adsorbed onto active solids, thereby reducing their sensitivity to water. This action causes the product to be depleted from the mud system at a rate dependent on the reactivity of the formation, cuttings size, and hole volume drilled. A test procedure is available to monitor the approximate concentration of excess KLA-GARD inhibitor.

Packaging and storage

KLA-GARD inhibitor is packaged in 55-galUS [208-L] drums and 5-galUS [18.9-L] cans.

Store in a dry, well-ventilated area. Keep container closed. Keep away from heat, sparks, and flames. Store away from incompatibles. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping, and stacking.

KWIK PLUG MEDIUM

Bentonite sealing agent

Certified to NSF/ANSI 60

Advantages

- Prevents entry of surface water into boreholes
- Forms a permanent, flexible, downhole seal
- Allows hole re entry
- Eliminates mixing expense
- Is more cost effective compared with pelletized bentonite

Limitations

When used as recommended, there are no limitations imposed on this product.

Toxicity and handling

Bioassay information available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described on the MSDS.

Packaging and storage

KWIK PLUG* bentonite sealing agent are packaged in 50-lbm [22.7-kg] heavy-duty multiwall waterproof sacks and various sized super sacks.

Store in a cool, dry place.

Typical Physical Properties	
Physical appearance	Beige to tan powder
Specific gravity	2.5–2.6
Permeability of resulting plug	1×10^{-9} cm/s.
Moisture	15%
Bulk density ¾-in agent	68 lbm/ft^3 [1,089.2 kg^3]
Bulk density ⅜-in agent	64 lbm/ft^3 [1,025.2 kg^3]

The KWIK PLUG MEDIUM* bentonite sealing agent is screen-sized bentonite composed of a naturally occurring clay that is used to seal and plug earthen boreholes. KWIK PLUG bentonite sealing agents will travel through water standing in the hole and reach the bottom of the hole with minimal hydration or swelling.

The annular space can be completely filled, and bridging of the particles in the upper portion of the hole minimized. Completely filling the annular space is necessary to form an effective, long-term plug. The agent is available in two sizes: coarse (¾ in [19.1 mm]) and medium (⅜ in [9.5 mm]). The size of the open annular space will determine which size should be used. When the annular space is 1½ in. [38.1 mm] or more, the coarse material is recommended. When the annular space is ¾ in [19.1 mm] or more, KWIK PLUG MEDIUM agent is recommended.

Applications

- Environmental monitoring wells
- Sealing outside casing annulus
- Plugging decommissioned boreholes
- Sealing lost circulation zones
- Sealing above gravel packs

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Lost Circulation Materials (LCM)

Drilling paper

Drilling paper is a blend of variable-sized particles of ground paper that is applicable for use in all water-based mud systems.

Drilling paper can be used in concentrations of up to 20 lbm/bbl [57 kg/m^3] in slug treatments or as an additive to the entire system. In areas of known lost circulation zones, it is advisable to pretreat the fluid system before drilling into the zone of loss. Drilling paper can be mixed through the mud hopper or added directly to the pits and gunned into the mud.

The most important aspect of combating lost circulation is using the correct particle size. Consequently, it is recommended that a combination of materials are added to ensure a good particle-size distribution.

If left in the mud for an extended period of time, drilling paper may be susceptible to bacterial degradation. Bactericide may be necessary to prevent fermentation.

Packaging and storage

Drilling paper is packaged in 40-lbm [18-kg] plastic sacks.

Mica

Mica is a selected, nonabrasive mineral available in fine and coarse grades. Mica has no adverse effect on mud properties. It is used to prevent and regain lost returns. Fine mica can pass through a 20-mesh screen.

Application

- Lost circulation: 5 to 15 lbm [2.25 to 6.75 kg]

Packaging and storage

Mica is packaged in 50-lbm [22.68-kg] sacks.

Cottonseed hulls

Cottonseed hulls are fibrous and biodegradable, creating an excellent bridging agent when large-particle-size material is needed. They can be used in any water-based mud system.

Cottonseed hulls are used in concentrations of up to 20 lbm/bbl [57 kg/m^3] as slug treatments or as an additive to the entire system. In areas of known lost circulation zones, it is advisable to pretreat the system before drilling into the zone of loss. Cottonseed hulls can be mixed through the mud hopper or added directly to the pits and gunned into the mud.

The most important aspect of combating lost circulation is using the correct particle size. Consequently, it is recommended that a combination of materials be added to ensure a good particle-size distribution.

If left in the mud for an extended period of time, cottonseed hulls can be susceptible to bacterial degradation, resulting in the release of H_2S and CO_2 into the mud. Bactericide may be necessary to prevent fermentation.

Packaging and storage

Cottonseed hulls are packaged in 50-lbm [22.68-kg] and 100-lbm [45.37-kg] burlap or paper sacks.

Cedar fiber

Cedar fiber is a specially processed blend of fibers of controlled length, giving proper size distribution for regaining circulation.

- Nonfermenting
- Amounts used vary from 1 to 35% by volume

Packaging and storage

Cedar fiber is packaged in 40-lbm [18-kg] bags.

FED-SEAL LCM

FED-SEAL LCM is an engineered product that contains an optimal blend of granular, fibrous, and flake materials. FED-SEAL LCM is available in three grinds (coarse, medium, and fine) covering a wide range of lost circulation problems.

FED-SEAL material is normally recommended in concentrations of 20 to 30 lbm/bbl [57 to 86 kg/m^3] mixed in a slug of 100 to 200 bbl and spotted at the zone of loss, displacing the slurry at a reduced pumping rate with either large nozzles or an open-ended system. FED-SEAL LCM can be added to either the water-based mud being used at the time of loss or in any special-purpose slurry prepared for squeeze applications.

The FED-SEAL material has been used for preventive measures or as a filler because the fine grade can pass through 20-mesh shaker screens in concentrations of 2 to 10 lbm/bbl [6 to 28 kg/m^3].

Limitations

Do not mix in oil muds.

Toxicity and handling

Bioassay information is available upon request.

Packaging and storage

FED-SEAL LCM is packaged in 40-lbm [18-kg] multiwall paper sacks.

MAX BORE HDD

One-step boring system

Certified to NSF/ANSI 60

Advantages

- Provides ease of mixing and reduces the number of products required to prepare boring fluid
- Hydrates more than other types of clays and is best for generating viscosity for hole cleaning, developing gels for suspension, and controlling filtration
- Delivers superior filtration characteristics because of its unique size, shape, and high surface area
- Provides lubricity and wellbore stability for ease of drilling and stability of water-sensitive clays and shales

Limitations

Performance is reduced in salty (>10,000 mg/L Cl^-) or hard (>240 mg/L Ca^{2+}) waters due to decreased hydration.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

MAX BORE HDD* one-step boring system is packaged in 50-lbm [22.7-kg] multiwalled sacks, 56 per pallet.

Store in a well-ventilated area away from sources of heat or ignition.

Typical Physical Properties	
Physical appearance	Light tan to gray-green powder
Specific gravity	2.3–2.6
Bulk density	48–52 lbm/ft³ [769–833 kg/m³]

The MAX BORE HDD one-step boring system is a proprietary blended, high-yielding Wyoming bentonite supplied as a single-sack product.

Applications

The MAX BORE HDD system provides suspension, improves wellbore stability, controls filtration, and helps reduce torque and drag in water-based boring-fluid applications. It is a cost-effective product for achieving viscosity for hole cleaning, gel strength for cuttings suspension and transport, wellbore stability, fluid-loss control, and filtercake quality in freshwater and seawater applications. Typical concentrations of the MAX BORE HDD system range from 15 to 45 lbm/100 galUS [18 to 54 kg/m³].

Typical Amounts of MAX BORE HDD System Added to Freshwater			
Drilling application or desired results	**lbm/100 gal**	**lbm/bbl**	**kg/m³**
Normal drilling	20–25	8.5–10	25–29
Clay environments	10–15	4–6	12–18
Gravel, rock, or cobble	25–30	10–13	29–37

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MAX GEL

Viscosifier

Certified to NSF/ANSI 60

Advantages

- Yields more quickly than API-standard bentonite
- Nontoxic and proven suitable for use in drilling potable water wells
- Enhances penetration rates due to lower solids content
- Reduces transportation and storage costs because less product is required for treatment

Limitations

Loses effectiveness in water containing >7,500 mg/L of sodium chloride or 240 mg/L of calcium.

If dispersants or thinners are needed, they should be added sparingly, using 50% or less of the normal treatment.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

MAX GEL* viscosifier is packaged in 50-lbm [22.7-kg] multiwall paper sacks and is available in bulk. It can be palletized at either 56 sacks/pallet or 70 sacks/pallet.

Store in a dry location because it poses a slip hazard when wet. Minimize dust by using dustless systems for handling, storage, and cleanup.

Store in a well-ventilated area away from sources of heat or ignition.

Typical Physical Properties	
Physical appearance	Light tan to gray-green powder
Specific gravity	2.3–2.5
Approximate yield	220 bbl/tonUS

MAX GEL viscosifier is a premium 220-bbl–yield Wyoming bentonite blended with special extenders, capable of yielding more than twice as much viscosity as regular Wyoming bentonite. It is easily mixed for freshwater drilling and boring applications.

Applications

MAX GEL viscosifier is used in the following applications to rapidly build mud viscosity and provide superior hole cleaning and to help control lost circulation and formation sloughing or promote hole stability in unconsolidated formations:

- Potable-water wells
- Mineral exploration (coring and rotary drilling)
- Horizontal directional drilling
- Blast holes
- Shaft drilling
- Monitor or observation wells
- Gel-foam or air-drilling applications

Typical Amounts of MAX GEL Viscosifier Added to Freshwater			
Drilling application or desired results	**lbm/100 galUS**	**lbm/bbl**	**kg/m³**
Normal drilling	15–25	6–11	15–30
Gravel or other poorly consolidated formation	25–40	12–18	35–50
Lost circulation control	35–45	15–20	40–45
Added to freshwater mud to improve hole-cleaning properties, increase hole stability, and develop filtercakes	5–10	2–5	6–14

M-I GEL

Viscosifier

Certified to NSF/ANSI 60

Advantages

- Hydrates more than other types of clays and is best for generating viscosity, developing gels for suspension, and controlling filtration
- Provides superior filtration characteristics because of its small particle size, unique flat shape, and high surface area of hydrated material
- Promotes the deposition of thin, compressible filtercakes in the wellbore

Limitations

Performance reduced in salty (>5,000 mg/L of Cl^-) or hard (>240 mg/L of Ca^{2+}) waters due to decreased hydration

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

M-I GEL* viscosifier is packaged in 100-lbm [45.4-kg] multiwall paper sacks, 88-lbm (40-kg) sacks, big bags, or is available in bulk.

Store in a dry, well-ventilated area. Keep container closed. Store away from incompatibles. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping, or stacking.

Typical Physical Properties	
Physical appearance	Light tan to gray-green powder
Specific gravity	2.3–2.6
Bulk density	48–52 lbm/ft³ [769–833 kg/m³]
ISO 135000 Clause 9 specifications: suspension properties (suspension of 22.5 g into 350 cm³ water):	
Viscometer dial reading at 600 rpm	30, min.
Yield point/plastic viscosity (YP/PV) ratio	3, max.
Filtrate volume	15 cm³, max.
Residue >75 um (wet screen)	4% wt, max.

M-I GEL viscosifier is a premium-grade bentonite (a sodium montmorillonite clay) that will yield 91 to 100 bbl of 15-cP mud per ton [1.7 m³/100 kg]. It is used as a primary filtercake-building, filtration-control and suspension agent in freshwater systems and has application in all water-based mud systems. M-I GEL viscosifier is a high-quality product that meets the ISO 13500 Clause 9 (formerly known as API spec 13A, section 9) specifications for bentonite.

Applications

M-I GEL viscosifier is used to achieve viscosity and control fluid loss in water-based drilling fluids. It is a cost-effective option for achieving viscosity, fluid-loss control, and filtercake quality in freshwater and seawater muds. Typical concentrations for M-I GEL viscosifier range from 5 to 35 lbm/bbl [14.3 to 100 kg/m³].

As with all bentonite products, the yield decreases as water salinity increases. In muds containing more than 10,000 mg/L of chlorides, the performance of M-I GEL viscosifier is significantly reduced unless prehydrated in freshwater before adding to the mud system.

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PLATINUM D-D

Aqueous surface active blend

Advantages

- Minimizes bit and BHA balling
- Reduces the surface tension of the liquid phase, helping to drop sand and remove drill solids
- Improves water-wetting action on all solids and reduces the sticking tendency of reactive shale cuttings
- Effective in all water-based fluids

Limitations

The freezing point of PLATINUM D-D* aqueous surface active additive blend is 32 degF [0 degC]. D-D* drilling detergent, a special cold-weather formulation with a freezing point of –29 degF [–20 degC], is also available.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Fluids containing high concentrations of PLATINUM D-D blend may not be suitable for discharge into all marine environments.

Packaging and storage

PLATINUM D-D blend is packaged in 5-galUS [18.9-L] cans and 55-galUS [208.2-L] drums.

Store in a well-ventilated area away from sources of heat or ignition.

Typical Physical Properties	
Physical appearance	Light red liquid
Specific gravity	1.038
pH (1% solution)	7.5–8.5
Solubility in water	100%
Flash point	>200 degF [>93 degC]

PLATINUM D-D aqueous surface active additive blend is an aqueous blend of surface-active agents. It is designed to reduce the surface tension of all water-based drilling fluid systems and reduce the sticking tendency of water-sensitive shale cuttings.

Applications

PLATINUM D-D additive has application in all drilling areas and can be used in virtually any water-based drilling fluid. It is used primarily in upper-hole drilling to minimize bit and bottomhole assembly (BHA) balling, reduce surface tension, and aid in dropping sand and removing drill solids.

PLATINUM D-D additive frequently reduces torque and drag, even when no oil is present in the system. Normal treatments range from 0.1 to 0.2 lbm/bbl [0.29 to 0.57 kg/m^3] and provide satisfactory performance under most conditions. In severe gumbo shale areas, concentrations of 4 to 6 lbm/bbl [11.4 to 17.1 kg/m^3] are recommended to minimize bit and BHA balling; higher concentrations can cause foaming and require a defoamer.

This product is effective in all water-based systems including freshwater, brackish water, seawater, and saturated saltwater fluids.

PLATINUM FOAM PLUS

Foaming agent

Certified to NSF/ANSI 60

Advantages

- Produces stable, consistent foam in all water types with excellent retention times
- Delivers excellent carrying capacity with small and tight bubble formation
- Meets most requirements for environmental acceptability and biodegradability
- Lubricating properties make it suitable for use with downhole hammers
- Improves hole cleaning and penetration rates

Limitations

When used as recommended, there are no limitations imposed on this product.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

PLATINUM FOAM PLUS* foaming agent is packaged in 5-galUS [18.9-L] buckets and 55-galUS [208.2-L] drums.

Store in a well-ventilated area away from sources of heat or ignition.

Typical Physical Properties	
Physical appearance	Clear to pale-yellow solution
Freeze point	15 degF [–9.4 degC]
Flash point	202 degF [94.4 degC]
Specific gravity	1.04
Solubility	100%
pH	7.5 to 8.5 (10% solution]

PLATINUM FOAM PLUS agent agent is water-soluble and biodegradable. It is specially designed to have a high flash point to minimize transit restrictions. In addition, PLATINUM FOAM PLUS agent is formulated to have a low freezing point for cold weather application, and it has the ability to foam in fresh, brackish or salty waters.

Applications

PLATINUM FOAM PLUS agent agent is used in air-drilling applications. Based on the amount of product added and the injection rate, it can be used for dust suppression, mist, foam, and stiff-foam drilling. Typical applications rates are 0.5 to 2% by volume of injection water.

Methods of addition

- To use as a dust suppressor or to prevent bit balling in a damp formation, mix ⅓ to ¾ pints [0.2 to 0.4 L] per 50 galUS [189 L] of water
- For mist drilling with moderate amounts of water intrusion. mix 1.5 to 3 pints [0.8 to 1.5 L] per 50 galUS [189 L] of water
- For foam drilling with excessive amounts of water intrusion, mix 6 pints [2.9 L] of product per 50 galUS [189 L] of water
- To obtain desired viscosity in stiff foams, mix MAX GEL viscosifier or POLY-PLUS 2000 inhibitor in 50 galUS [189 L] of water to 32 sec/quart and stir in ¾ galUS [3 L] of PLATINUM FOAM PLUS agent. Pump the slurry into the air stream at 7 to 10 galUS/min [26.6 to 38 L/min]. POLY-PLUS inhibitor may be substituted for POLY-PLUS 2000 inhibitor.

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PLATINUM PAC

Cellulosic filtration control polymer

Certified to NSF/ANSI 60

Advantages

- Controls fluid loss and produces a thin, slick, tough filtercake
- Inhibits the hydration of and encapsulates drill solids
- Improves mixing in low-shear environments
- Disperses more readily as compared with conventional dry PAC polymers
- Inhibits swelling and dispersion of shale particles and clay
- Resists bacterial attack
- Functions over a wide range of salinity, hardness, and pH levels

Limitations

- Stable to circulating temperature of approximately 300 degF [149 degC]
- Effective in systems with total hardness <1,000 mg/L (as calcium) but can be precipitated in the combined presence of high hardness and high pH

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Typical Physical Properties	
Physical appearance	White or off-white powder
Ionic character	Anionic
Bulk density	0.64 to 9.0 g/cm^3
pH	6.5 to 9.0

Packaging and storage

PLATINUM PAC* cellulosic filtration control polymer is packaged in 2-lbm [0.91-kg] bottles, 25 per case; 25-lbm [11.3-kg] net product in 5-galUS [18.9-L] buckets; and 50-lbm [22.7-kg] bags.

PLATINUM PAC polymer should be stored inside under cool, dry conditions.

PLATINUM PAC* polymer is a readily dispersible, water-soluble polymer designed to control fluid loss in water-based muds.

Applications

PLATINUM PAC polymer is effective in low concentrations, with the normal fluid-loss treatment ranging from 0.25 to 1 lbm/bbl [0.71 to 2.85 kg/m^3]. This product is applicable in all water-based muds, ranging from low-solids, non dispersed polymer systems to high-density, dispersed systems. It is used as a filtrate reducer and borehole stabilizer in water-based drilling applications.

PLATINUM PAC UL

Low-viscosity cellulosic filtration control polymer

NSF Certified to NSF/ANSI 60

Advantages

- Readily dispersible
- Controls fluid loss at low concentration
- Produces minimal viscosity increase
- Inhibits shale and clay swelling and dispersion
- Resists bacterial attack, requiring no biocides or preservatives
- Functions over a wide range of salinity, hardness, and pH levels
- Has application in all water-based, low-solids, nondispersed mud systems. Compatible with all common mud-treating additives
- Excellent environmental acceptability

Limitations

- Stable at circulating temperatures to approximately 300 degF [149 degC]
- Effective in systems with total hardness <1,000 mg/L (as calcium) but can be precipitated in the combined presence of high hardness and high pH

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

PLATINUM PAC UL* low-viscosity cellulosic filtration control polymer is packaged with 25-lbm [11.3-kg] net product in 5-galUS [19-L] buckets and 50-lbm [22.7-kg] bags.

Store in a cool, dry place.

Typical Physical Properties	
Physical appearance	White, free-flowing powder
Specific gravity	1.5–1.6
pH (1% solution)	6.5–8.0

PLATINUM PAC UL low-viscosity cellulosic filtration control polymer is a high-quality, water-soluble polymer designed to control fluid loss. It causes a minimal increase in viscosity in water-based muds. PLATINUM PAC UL polymer is readily dispersible in a wide range of water-based mud systems.

Applications

PLATINUM PAC UL polymer controls fluid loss in freshwater, seawater, KCl, and salt muds. It forms a thin, resilient, low-permeability filtercake that minimizes the potential for differential sticking and the invasion of filtrate and mud solids into permeable formations. PLATINUM PAC UL polymer resists bacterial attack, eliminating the need for biocides or preservatives. It is effective in low concentrations, with the normal fluid-loss treatment ranging from 0.25 to 1 lbm/bbl [0.71 to 2.85 kg m^3]. In saltwater and PAC-polymer systems, higher concentrations are required for encapsulation, with normal concentrations ranging from 1 to 3 lbm/bbl [2.85 to 8.6 kg/m^3].

Because PLATINUM PAC UL additive is low viscosity, it generates less viscosity as compared to POLYPAC* filtrate control additive and PLATINUM PAC cellulosic filtration control polymer. The viscosity generated depends on the solids concentration, salinity, and makeup-water chemistry.

PLATINUM PAC UL polymer attaches to and encapsulates exposed shales and drill cuttings. This protective polymer envelope inhibits the dispersion of shale cuttings and restricts fluid interactions with exposed shales.

In saturated salt systems, PLATINUM PAC UL polymer tends to work significantly better than regular-viscosity PAC materials. For difficult filtration-control fluids, a combination of this product and regular-viscosity PAC products is generally most effective.

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PLATINUM ROD EASE

Lubricant

Benefits

- Reduces torque and drag
- Prevents rust and scale
- Environmentally safe
- Increases penetration rates
- Extends bit and mud motor life
- Increases mud motor efficiency
- Reduces wear on rods and equipment
- Maximizes rig potential and steering control
- Enhances the effectiveness of powdered drilling fluid additives
- Reduces jacking forces

Applications

PLATINUM ROD EASE* lubricant mixes instantly and is not affected by water quality. For this product to deliver effective rod protection and reduce torque after drilling has started, consideration must be given to the number of rods and the amount of fluid in the hole. Initial treatment can require dosing the system with several pails of lubricant. Established maintenance levels are required after initial dosage and treatment. Normal treatment levels are 1 to 2% of fluid volume or 0.473 to 0.946 L [1 to 2 pints] per 378.5 L [100 galUS] of drilling fluid. The dosage amount should be increased if the penetration rate decreases, torque increases, or the run length decreases indicating poor cutting.

Typical Physical Properties	
Physical appearance	White, free-flowing powder
Specific gravity	0.88–0.9
pH	7.0–8.0 (1% solution)
Pour point	–9 degC [15 degF]
Flash point	>121 degC [>250 degF]

Limitations

None

Packaging and storage

PLATINUM ROD EASE lubricant is packaged in 18.9 L [5 galUS] buckets and 208.2 L [55 galUS] drums.

Store in a well-ventilated area away from sources of heat or ignition.

PLATINUM ROD EASE lubricant is based on an environmentally safe technology that has proven effective in lubricating downhole consumables.

This product has produced both bit-life and penetration increases of more than 25% during drilling operations. Because PLATINUM ROD EASE lubricant reduces torque and drag, the operator can use the drill rig to its full potential, meaning thrusts and pulls are at a minimum, and steering control is precise. PLATINUM ROD EASE lubricant is also effective in lubricating the drill rods in wireline coring operations.

POLYPAC R

Polyanionic-cellulose filtration-control additive

Advantages

- Effective in low concentrations for controlling fluid loss and building viscosity
- Encapsulates shale particles to inhibit swelling and dispersion
- Resists bacterial attack, requiring no biocides or preservatives
- Functions over a wide range of salinity, hardness, and pH levels
- Applicable in all water-based muds, ranging from low-solids, nondispersed polymer systems to high-density, dispersed systems
- Compatible with all common mud-treating additives
- Excellent environmental acceptability

Limitations

- Stable to circulating temperatures of approximately 300 degF [149 degC]
- Effective in systems with total hardness <1,000 mg/L (as calcium), but can be precipitated in the combined presence of high hardness and high pH

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

POLYPAC R* polyanionic-cellulose filtration-control is packaged in 50-lbm [22.7-kg] and 55-lbm [25-kg], heavy-duty, multiwall waterproof sacks.

Store in a dry, well-ventilated area away from incompatibles or sources of heat or ignition.

Typical Physical Properties	
Physical appearance	White, free-flowing powder
Specific gravity	1.5–1.6
pH (1% solution)	6.5–8.0

POLYPAC R additive is a high-quality, water-soluble polymer designed to control fluid loss and increase viscosity in water-based drilling fluids.

Applications

POLYPAC R additive controls fluid loss in freshwater, seawater, KCl, and salt muds. The polymer forms a thin, resilient, low-permeability filtercake that minimizes the potential for differential sticking and the invasion of filtrate and mud solids into permeable formations.

POLYPAC R additive resists bacterial attack, eliminating the need for biocides or preservatives. It is effective in low concentrations, with the normal fluid-loss treatment ranging from 0.25 to 1 lbm/bbl [0.71 to 2.85 kg/m^3]. POLYPAC R additive also develops viscosity to a degree that is dependent on the solids concentration, salinity, and makeup water chemistry.

POLYPAC R additive attaches to and encapsulates exposed shales and drill cuttings. This protective polymer envelope inhibits the dispersion of shale cuttings and restricts fluid interactions with exposed shales.

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POLYPAC UL

Ultralow-viscosity polyanionic cellulose

Advantages

- Effective in low concentrations for controlling fluid loss and building viscosity
- Produces minimal viscosity increase
- Encapsulates shale particles to inhibit swelling and dispersion
- Resists bacterial attack, requiring no biocides or preservatives
- Functions over a wide range of salinity, hardness, and pH levels
- Has application in all water-based muds
- Excellent environmental acceptability

Limitations

- Stable at circulating temperatures to approximately 300 degF [149 degC]
- Effective in systems with total hardness <1,000 mg/L (as calcium), but can be precipitated in the combined presence of high hardness and high pH

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions described in the MSDS.

Packaging and storage

POLYPAC UL* ultralow-viscosity polyanionic cellulose is packaged in 50-lbm [22.7-kg] and 55-lbm [25-kg] heavy-duty, multiwall waterproof sacks.

Store in a cool, dry place.

Typical Physical Properties	
Physical appearance	White, free-flowing powder
Specific gravity	1.5–1.6
pH (1% solution)	6.5–8.0

POLYPAC UL ultralow-viscosity polyanionic cellulose (PAC) is a high-quality, water-soluble polymer designed to control fluid loss. Because it is an ultralow-viscosity additive, it causes minimal increase in viscosity in water-based muds.

Applications

POLYPAC UL cellulose controls fluid loss in freshwater, seawater, KCl, and salt muds. It forms a thin, resilient, low permeability filtercake that minimizes the potential for differential sticking and the invasion of filtrate and mud solids into permeable formations. POLYPAC UL cellulose resists bacterial attack, eliminating the need for biocides or preservatives. It is effective in low concentrations, with the normal fluid-loss treatment ranging from 0.25 to 1 lbm/bbl [0.71 to 2.85 kg/m^3]. In saltwater and PAC polymer systems, higher concentrations are required for encapsulation, with normal concentrations ranging from 1 to 3 lbm/bbl [2.85 to 8.6 kg/m^3].

POLYPAC UL cellulose generates less viscosity than regular POLYPAC polymer. The viscosity generated depends on solids concentration, salinity, and makeup water chemistry.

The anionic POLYPAC UL cellulose attaches to and encapsulates exposed shales and drill cuttings. This protective polymer envelope helps inhibit the dispersion of shale cuttings and restricts fluid interactions with exposed shales.

In saturated salt systems, POLYPAC UL cellulose tends to work significantly better than regular-viscosity PAC materials. For difficult filtration-control fluids, a combination of this product and regular-viscosity PAC products is generally more effective.

POLY-PLUS

High-molecular-weight liquid clay inhibitor

Certified to NSF/ANSI 60

Advantages

- Provides excellent cutting encapsulation and limits cuttings dispersion
- Improves shale stabilization
- Enhances drill-solids removal in clear-water systems and the carrying capacity of foams
- Mixes easily with rapid yield
- Has a low pour point of –20 degF [–28.9 degC] for use in cold climates
- Can be used to viscosify clear-water, low-solids drilling fluids
- Improves the lubricity of most mud systems, particularly nondispersed systems and dispersed mud, when used with a lubricant
- Helps prevent bit balling and balling on stabilizers and bottomhole assemblies by coating and lubricating solids

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

POLY-PLUS* high-molecular-weight liquid clay inhibitor is packaged in 5-galUS [18.9-L] buckets. Store in a dry location away from sources of heat or ignition, and minimize dust.

Typical Physical Properties	
Physical appearance	Cream-colored, opaque liquid
Odor	Slightly hydrocarbon
Specific gravity	1.07–1.10
pH (1% solution)	8.0–9.0
Flash point (PMCC)	>200 degF [93.3 degC]
Pour point	–20 degF [–28.9 degC]
Viscosity (typical)	~500 cP

POLY-PLUS high-molecular-weight liquid clay inhibitor is an anionic liquid designed to provide cuttings encapsulation and shale stabilization. POLY-PLUS inhibitor also acts as a viscosifier, friction reducer, and flocculant. POLY-PLUS inhibitor can be used in mud systems based on makeup waters from freshwater to saltwater.

Applications

POLY-PLUS inhibitor mud systems

The POLY-PLUS inhibitor provides excellent cuttings encapsulation and improved wellbore stability. Typical concentrations are 0.75 to 3 lbm/bbl [2.1 to 8.5 kg/m^3]. It is also effective in salt muds, such as KCl- or NaCl-enhanced fluids, although slightly higher concentrations of POLY-PLUS inhibitor may be required.

Clear-water fluids

POLY-PLUS inhibitor can be used in clear-water, solids-free drilling fluids. POLY-PLUS inhibitor increases viscosity and enhances solids removal by flocculating the undesired solids. It also encapsulates cuttings and improves wellbore stability.

This inhibitor is frequently used in slimhole, continuous-coring applications. Adding 0.5 to 1.75 lbm/bbl [1.4 to 5 kg/m^3] enhances solids removal by flocculating solids.

Low-solids, nondispersed (LSND) muds

POLY-PLUS inhibitor is well suited to LSND systems. In reduced-bentonite muds, POLY-PLUS inhibitor serves as a bentonite extender to increase viscosity and as a flocculant to more efficiently remove drill solids. It also encapsulates cuttings and improves wellbore stability.

Weighted muds

POLY-PLUS inhibitor can be used in weighted muds for cuttings encapsulation, improved wellbore stability, secondary viscosity, and improved filtercake integrity. The effectiveness of the polymer diminishes as the concentration of organic, anionic dispersants increases.

POLY-PLUS inhibitor sweeps

Viscous POLY-PLUS inhibitor sweeps are effective for periodic hole cleaning. Circulating a POLY-PLUS inhibitor sweep through the well or borehole helps clear accumulated cuttings and maintain a clean hole.

Concentration†, lbm/bbl [kg/m^3]	galUS/bbl [L/m^3]	galUS/100 galUS
0.50 [1.4]	0.056 [1.3]	0.133
0.75 [2.1]	0.084 [2.0]	0.200
1.00 [3.0]	0.110 [2.6]	0.262

†Based on 30% active material

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POLY-PLUS 2000

Liquid clay inhibitor

Certified to NSF/ANSI 60

Advantages

- 50% active material
- Low dosage rate for comparable viscosities
- Encapsulates drill solids
- Stabilizes clay formations

Limitations

Less effective in fluids with total hardness values in excess of 200 ppm. To optimize POLY-PLUS 2000* liquid clay inhibitor characteristics, maintain total hardness at 100 ppm or less.

Less effective in temperatures above 275 degF [135 degC]. The effective temperature range can be increased to 325 degF [162 degC] by adding an oxygen scavenger to the mud.

Effectiveness also decreases in fluids that have a pH of 10.2 or greater.

Toxicity and handling

Bioassay information available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described on the MSDS.

Packaging and storage

POLY-PLUS 2000 liquid clay inhibitor is supplied in 5-galUS [18.9-L] buckets.

Cleanup

POLY-PLUS 2000 inhibitor can be chemically broken with liquid bleach in regular household concentration (5% sodium hypochlorite). Use 5-galUS [18.9-L] of liquid bleach per 100 galUS [378.5 L] of fluid formulated with POLY-PLUS 2000 inhibitor. Do not use perfumed liquid bleach or solid calcium hypochlorite.

Typical Physical Properties	
Physical appearance	White, granular powder
Odor	Slightly hydrocarbon
Viscosity (typical)	200–500 cP
Specific gravity	1.06–1.08
pH (1% solution)	6.5–7.5
Flash point	248 degF [120 degC]

POLY-PLUS 2000 high-solids liquid clay inhibitor is a multifunctional synthetic copolymer developed for use in freshwater-, potassium-, and saltwater-based drilling fluids. POLY-PLUS 2000 inhibitor water-free disperson has excellent freeze and thaw stability and is not subject to phase separation or premature activation inside the pail or drum. POLY-PLUS 2000 inhibitor provides the same benefits as regular POLY-PLUS inhibitor, but at lower concentration.

Applications

Viscosity

POLY-PLUS 2000 inhibitor is a cost-effective viscosifier in low-salinity fluids. Its shear-thinning properties maximize penetration rates at the bit under high shear rates and exhibit excellent hole-cleaning characteristics under low shear rates. It also enables easy solids deposition in settling pits.

Add 1 to 3 vis cups [1 to 3 L] per 300 galUS [1,135 L] of fluid for desired viscosity.

Shale stabilization and inhibition

POLY-PLUS 2000 inhibitor can be used alone or with KCl to stabilize active shales. It protects by encapsulating reactive shales, forming a protective coating on the wellbore and around cuttings. Coating reduces the shale's tendency to absorb water, swell, and slough.

Add at least 1 vis cup [1 L] per 300 galUS [1,135 L] of fluid.

Foam stabilization

The long-chain polymer of POLY-PLUS 2000 inhibitor creates a tighter, stronger foam, which improves the fluid's cuttings-carrying capacity.

Add 1 to 2 vis cups [1 to 2 L] per 100 galUS [378.5 L] of fluid.

Flowline flocculant

Small concentrations of POLY-PLUS 2000 inhibitor (0.01–0.05 lbm/bbl [0.028–0.14 kg/m^3]) economically flocculate drill solids. Additions should be made at the flowline to optimize settling time of drill solids in the pits.

Friction reduction and lubrication

The POLY-PLUS 2000 inhibitor's shear-thinning properties reduce power losses at points of high shear, especially at the drill bit and at the other restrictions such as the pump discharge and drill collars. The polymer structure also helps reduce turbulence, which reduces erosion and the likelihood of washouts in weak formations.

Add at least 1 vis cup [1 L] per 300 galUS [1,135 L] of fluid.

Fluid-loss control

Add at least 2 vis cups [2 L] per 300 galUS [1,135 L] of fluid to be effective. Some solids may be required.

POLY-PLUS EHV

Inhibitor

Certified to NSF/ANSI 60

Advantages

- Provides a clay-free boring fluid that disperses easily with minimal shear
- Soil stabilizer can be used to replace bentonite at a ratio of 1:100 (e.g., one 50-lbm [22.7-kg] bag can replace 2.5 tonUS [2.3 metric tons] of bentonite in a typical geo-construction application)
- Produces very-high-viscosity slurries at low dosage rates
- Slurries typically have low gel strength
- Slurry binds loose sand, clay, shale, and gravel, facilitating their removal and preventing dispersal into the slurry
- Reduces fluid loss by penetrating the surrounding soil with a high-viscosity gel fluid, sealing the walls of the excavation site without the use of a conventional filter cake
- Stabilizes reactive formations and is an efficient viscosifier for a clear, solids-free drilling fluid
- Provides high cohesiveness to bind sandy soil and gravel
- Enhances core recovery in continuous wireline coring operations
- Facilitates the removal of drilled soils from augers
- Nonfermenting, no petroleum distillates, and easily broken with household bleach

Toxicity and handling

When used in accordance with the manufacturer's published instructions, this product is considered nonhazardous. Drill cuttings exposed to POLY-PLUS EHV ultrahigh-molecular-weight clay inhibitor should be washed with calcium hypochlorite to break down the inhibitor before the cuttings are confined or stored in a sealed container or drum.

Typical Physical Properties	
Physical appearance	White, granular powder
Ionic character	Anionic
Density	0.8 g/cc
Bulk density	50 lbm/ft^3 (800 kg/m^3)
pH (1% solution)	6.0 to 8.0

Packaging and storage

POLY-PLUS EHV inhibitor is supplied in 5-galUS [18.9 L] buckets.

POLY-PLUS EHV inhibitor should be stored inside under cool, dry conditions.

POLY-PLUS EHV ultrahigh-molecular-weight clay inhibitor is an extremely high-molecular weight, high-charge, polyacrylamide supplied as a dry granular powder. POLY-PLUS EHV inhibitor produces very high viscosity solutions at low dosage rates, particularly in freshwater. It has excellent handling characteristics, mixes easily, and dissolves quickly when added to water-based fluid systems.

Applications

POLY-PLUS EHV inhibitor is ideally suited for applications such as water-well drilling, mineral exploration, and construction applications.

Due to its very high molecular weight, POLY-PLUS EHV inhibitor is also an excellent flocculant for dewatering drilling fluids, waste pits, and sumps.

POLY-PLUS EHV inhibitor has several functions:

Viscosifier

Adding 0.5 to 1 lbm/bbl [1.4 to 2.9 kg/m^3] of POLY-PLUS EHV inhibitor is a cost-effective way to generate viscosity in fresh- or low-salinity drilling fluids. Its shear-thinning capacity ensures maximum power at the bit under high shear while retaining excellent carrying capacity under low-shear conditions.

Flocculant

As a flowline flocculant, POLY-PLUS EHV inhibitor can also be used for clear-water or low-solids drilling. Adding a 5% solution of POLY-PLUS EHV ainhibitor into the flowline or just prior to any mechanical separation greatly enhances the removal of drill solids.

Friction reducer

Adding POLY-PLUS EHV inhibitor to a drilling fluid helps to reduce turbulent flow, friction, and power losses at points of high shear. Lowering turbulent flow also helps reduce erosion and washouts of fragile geologic structures.

Mixing instructions

Add slowly and uniformly through a high-shear jet type mixer. Continue to circulate and agitate the slurry until all materials are dispersed and dissolved.

Recommended application amounts:

Normal consolidated formation:
1.5 to 2 lbm [0.7 to 0.9 kg] per 100 galUS [378.5 L] water or
0.6 to 0.8 lbm/bbl [1.7 to 2.3 kg/m^3]

Unconsolidated formation:
2.5 to 3.5 lbm [1.1 to 1.6 kg] per 100 galUS [378.5 L] water or 1 to 1.5 lbm/bbl [2.9 to 4.3 kg/m^3])

Cleanup

POLY-PLUS EHV inhibitor can be chemically broken with liquid bleach in regular household concentration (5% sodium hypochlorite). Use 1 galUS [3.8 L] of liquid bleach per 100 galUS [378.5 L] of fluid formulated with POLY-PLUS EHV inhibitor. Do not use perfumed liquid bleach or solid calcium hypochlorite.

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POLY-PLUS RD

Readily dispersible clay inhibitor

Certified to NSF/ANSI 60

Advantages

- Disperses readily and does not form fish eyes
- Limits cuttings dispersion with excellent cuttings encapsulation
- Improves shale stabilization
- Reduces toxicity as compared with invert-emulsion, liquid polymers
- Reduces transportation costs and storage space requirements because of high concentration (>90% activity)
- Coats and lubricates solids to prevent balling on the bit, stabilizers, and bottom-hole assembly
- Enhances removal of drill solids
- Can be used to viscosify clear-water and low-solids drilling fluids

Limitations

- Severe flocculation can occur during the initial treatment of POLY-PLUS RD* readily dispersible clay inhibitor in a nondispersed mud system. Flocculation causes high viscosity until all of the solids are coated. Use low concentrations (<15 lbm/bbl [<43 kg/m³]) of MAX GEL viscosifier to reduce this interaction. Continued additions of POLY-PLUS RD inhibitor result in a stable system with the desired rheology
- Calcium-sensitive—begins to precipitate when the calcium concentration exceeds 300 mg/L
- pH-sensitive with an optimal pH range of 8.5 to 10.5. At levels above this range, hydrolysis can convert acrylamide into acrylate and release ammonia (NH_3)
- Temperature-stable to approximately 350 degF [177 degC], although the copolymer can begin to release ammonia (NH_3) and hydrolyze into polyacrylate when exposed to prolonged temperatures above 275 degF [135 degC]
- Subject to shear degradation of its viscosity and can lose its ability to viscosify. Cuttings encapsulation and shale stabilization are not affected

Toxicity and handling

Bioassay information available upon request.

No special requirements are necessary for handling and storage. Avoid inhalation of dust. A dust respirator and goggles are recommended if mixing in an enclosed area.

Packaging and storage

POLY-PLUS RD inhibitor is packaged in 50-lbm [22.7-kg] multiwall paper sacks or 5-galUS [18.9-L] buckets.

Store in a dry location away from sources of heat or ignition, and minimize dust.

Contamination

POLY-PLUS RD inhibitor reacts with multivalent cations such as calcium. In concentrations greater than 300 mg/L, calcium causes the polymer to precipitate. Use soda ash to remove calcium concentrations above 300 mg/L.

Treat cement contamination to keep the calcium and pH as low as possible. Use sodium bicarbonate along with a pH-reducing product like lignite or citric acid to treat cement contamination.

POLY-PLUS RD readily dispersible clay inhibitor is a readily dispersible product designed to provide cuttings encapsulation and shale stabilization. It is formulated for easy mixing with improved dispersion to eliminate fish eyes. This is beneficial when rapidly mixing either large quantities or high concentrations of polymer where good mixing equipment is unavailable. POLY-PLUS RD inhibitor acts as a viscosifier, friction reducer, and flocculant. It also provides some fluid-loss control.

POLY-PLUS RD inhibitor is a specially treated, high-molecular-weight product. It can be used in systems ranging from low solids to weighted muds, using makeup waters from freshwater to saltwater.

Addition method

POLY-PLUS RD inhibitor can be mixed directly into the active mud system. It can also be premixed at higher concentrations in a separate pit or chemical barrel, then blended into the active system. Sweeps can be prepared by mixing POLY-PLUS RD inhibitor.

Typical Physical Properties	
Physical appearance	White, granular powder
Odor	Slightly hydrocarbon
Specific gravity	1.25 to 1.40
pH (1% solution)	7.7
Bulk density	40 to 46 lbm/ft^3 [641 to 737 kg/m^3]
Nature of charge	Anionic
Activity	>90%

Typical Properties of POLY-PLUS Rd in Freshwater			
Concentration lbm/bbl [kg/m^3]	**PV, cP**	**YP, lbm/100 ft^2**	**Marsh funnel, sec/qt**
0.125 [0.4]	2	1	28
0.25 [0.7]	3	2	31
0.50 [1.4]	4	4	34
0.75 [2.1]	6	8	46
1.00 [2.9]	9	11	60
1.50 [4.3]	15	17	110

Applications

POLY-PLUS RD inhibitor mud systems

POLY-PLUS RD inhibitor provides excellent cuttings encapsulation and improved wellbore stability. Typical concentrations of POLY-PLUS RD inhibitor are 0.25 to 1 lbm/bbl [0.71 to 2.85 kg/m^3]. It is also effective in salt muds, such as KCl- or NaCl-enhanced fluids, although slightly higher concentrations of POLY-PLUS RD inhibitor can be required.

Clear-water fluids

POLY-PLUS RD inhibitor can be used in clear-water, solids-free drilling fluids. This product enhances solids removal by flocculating the undesired solids and increasing viscosity. The polymer also provides cuttings encapsulation and improved wellbore stability. POLY-PLUS RD inhibitor is frequently used in slimhole, continuous-coring applications.

Low solids nondispersed mud (LSND) muds

POLY-PLUS RD inhibitor is well suited to LSND systems. In reduced-bentonite muds, POLY-PLUS RD inhibitor extends bentonite to increase viscosity, flocculates drill solids for more efficient removal, encapsulates cuttings, and improves wellbore stability.

POLY-PLUS RD inhibitor sweeps

Viscous POLY-PLUS RD inhibitor sweeps are effective for periodic hole cleaning. Circulating a POLY-PLUS RD inhibitor sweep through the well helps clear accumulated cuttings and maintain a clean hole.

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POLYSWELL

Copolymer swelling LCM

Advantages

- Can be prehydrated before adding
- Can accumulate in a variety of fracture sizes due to swelling capacity and variability in size

Limitations

Improper placement of POLYSWELL* copolymer can result in stuck drill rods.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

Packaging and storage

POLYSWELL copolymer is packaged in 5-galUS [18.9-L] buckets.

Store in a dry location away from sources of heat or ignition.

Method of addition

POLYSWELL copolymer can be mixed in water or drilling mud with or without LCM. Add 1 to 3 lbm [0.5 to 1.5 kg] per 4 galUS [20 L] of water or mud in a pail. Lesser and greater amounts have been used]. Pump the mixture as soon as possible once the dry polymer beads are mixed. When using POLYSWELL copolymer in core drilling, be sure the core tube has been pulled before pumping the solution downhole. Repeat as necessary to stop fluid loss.

Typical Physical Properties	
Physical appearance	White powder
Specific gravity	0.8 to 1.0
Solubility	Swells on contact with water

POLYSWELL copolymer is used in lost circulation and expands to 200 times its volume in freshwater. This material is considered environmentally acceptable.

Applications

POLYSWELL copolymer is used to fill or seal fractures. As the material fully hydrates, the fracture is sealed. This product can also be spotted in caving zones to reduce caving problems.

Directly after placing the POLYSWELL copolymer pill, pull up above the problem zone to prevent sticking. Full hydration occurs in 20 to 30 min. Circulate with mud and lost circulation material (LCM) to fill the bridge.

RINGFREE

Polymeric thinner

Certified to NSF/ANSI 60

Advantages

- RINGFREE* polymeric thinner is an excellent clay dispersant that quickly penetrates sticky clays that can cause tools to stick
- Works quickly to alleviate hole problems and reduce costly pulling times or lost pipe

Limitations

Effectiveness is reduced in fluids with more than 1,000 ppm dissolved calcium and 10,000 ppm chlorides. Since RINGFREE thinner reduces mud rheology, caution should be exercised when adding it to the active mud system.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

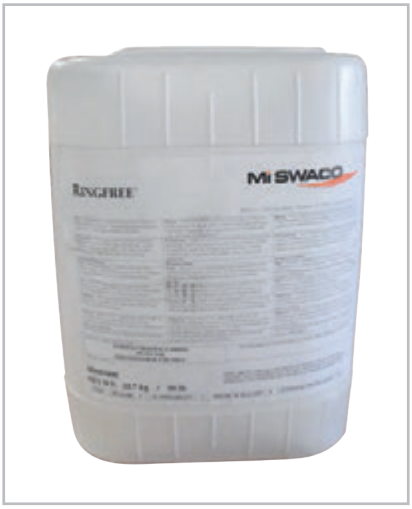
Packaging and storage

RINGFREE thinner is packaged in 5-galUS [18.9-L] buckets.

Store in a well-ventilated area away from sources of heat or ignition.

Methods of addition

- Bit balling/mud rings: Use ½ vis cup [0.5 L] per 300 galUS [1,135 L] of fluid up to 0.5 to 1.5 galUS [1.9 to 5.7 L] per 300 gal [1,135 L] of fluid. An alternate method is to slug rods with 1 vis cup [1 L] on connections
- Thinning: Slowly add RINGFREE thinner to the mud as needed to reduce viscosity



Typical Physical Properties	
Physical appearance	Pale yellow liquid
Specific gravity	1.3
pH as supplied	7 to 7.5

RINGFREE thinner is a highly efficient, thermally stable thinner and surface-active agent that removes bentonite clays from the drillstring. It is environmentally acceptable and contains no heavy metals. Because it dissolves rapidly, RINGFREE thinner immediately affects the rheology of most drilling fluids.

Applications

RINGFREE thinner is used primarily to prevent bit balling and mud rings. It can also be used to reduce the viscosity and gel strengths of most freshwater drilling fluids.

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ROD COAT L 1000

Advanced drilling rod coating grease

Benefits

- Superior resistance to water washing
- Corrosion, wear, and oxidation resistance
- Reduced tripping frequency for greasing

Applications

ROD COAT L 1000* advanced drilling rod coating grease is used primarily to reduce rod vibration, especially in holes with lower water tables.

Addition methods

To improve lubricity and reduce rod vibration, apply ROD COAT L 1000 grease to the exterior of the rods while tripping into the hole. The rods should be dry for best adhesion. In unstable hole situations, apply ½ in [12.7 mm] of ROD COAT L 1000 grease to the exterior of the rods. This puts a layer of grease on the walls of the hole, which improves stability.

Limitations

ROD COAT L 1000 grease has a hydrocarbon base and does not degrade. Use of ROD COAT L 1000 grease should be limited to areas that are not environmentally sensitive.

Packaging and storage

ROD COAT L 1000 grease is supplied in 5-galUS [18.9 L] buckets.

ROD COAT L 1000 grease reduces rod vibration.

Typical Physical Properties	
Physical appearance	Fibrous semi solid
Solubility	Nil
Specific gravity at 61 degF [16 degC]	0.926

ROD EASE

Rod lubricant

Advantages

- Reduces torque
- Prevents rust and scale
- Improves environmental safety
- Increases penetration rates
- Extends bit and mud motor life
- Increases mud motor efficiency
- Reduces wear on rods and equipment
- Maximizes rig potential and steering control
- Enhances the effectiveness of powdered drilling fluid additives

ROD EASE* rod lubricant is based on an environmentally safe technology that has proven effective in lubricating downhole consumables. This product has produced both bit-life and penetration increases of more than 25% during drilling operations. Because ROD EASE lubricant reduces torque and drag, the operator can use the drill rig to its full potential, meaning thrusts and pulls are at a minimum and steering control is precise.

Tests performed in the M-I SWACO laboratory in Houston confirm the effects of ROD EASE lubricant.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the material safety data sheet [MSDS].

Packaging and storage

ROD EASE lubricant is packaged in 5 galUS [18.9 L] buckets and 55 galUS [208.2 L] drums.

Store in a well-ventilated area away from sources of heat or ignition.

Typical Physical Properties	
Physical appearance	Dark brown liquid
Specific gravity	0.887
pH	7.0 to 7.5
Boiling point	572 degF [>300 degC]
Freezing point	–77 degF [–25 degC]
Flash point	554 degF [290 degC]

This product is a superior lubricant for HDD, coring, and rotary drilling.

Applications

ROD EASE lubricant mixes instantly and is not affected by water quality. For this product to deliver rod protection and reduce torque after drilling has started, consideration must be given to the number of rods and the amount of fluid in the hole. Treatment can require dosing the system with several pails of lubricant. Established maintenance levels are required after initial dosage and treatment. Normal treatment levels are 1 to 2% of fluid volume or 1 to 2 pints [0.473 to 0.946 L] per 100 galUS [378.5 L] of drilling fluid. The dosage amount should be increased if the penetration rate decreases, torque increases, or the run length decreases indicating poor cutting.

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SMOOTH GROUT 30

30%-active-solids slurry grout

Certified to NSF/ANSI 60

Advantages

- Inorganic, nonfermenting and nontoxic
- Develops lower-solids slurries up to 30% activity
- Easily mixed with most conventional rig equipment
- Permanent, flexible seal prevents entry of contaminants from the surface
- Extended working time controlled by the grout solids content
- Firm texture providing structural stability after grout set

Limitations

When used as recommended, there are no limitations imposed on this product.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the material safety data sheet (MSDS).

Packaging and storage

SMOOTH GROUT 30* 30%-active-solids slurry grout is packaged in 50-lbm [22.7-kg], multiwall paper sacks and is available in bulk. Store in a dry location (slip hazard when wet) and minimize dust (use dustless systems for handling, storage, and cleanup).

Material can be palletized at either 56/pallet or 70/pallet.

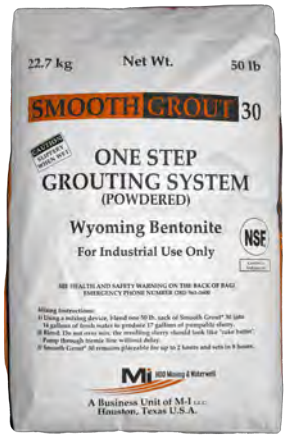
Store in a well-ventilated area away from sources of heat or ignition.

For more information, please request a product bulletin from your M-I SWACO representative.

Typical Physical Properties	
Physical appearance	Beige to tan powder
Moisture content	8%
Specific gravity	2.5
pH (8% slurry]	7.0
Slurry density	10 lbm/galUS [1.2 kg/L] for 30% solids
Dry bulk density	64 lbm/ft³ [1,025.2 kg/m³]
Screen analysis	75% min. passing through 200-mesh

SMOOTH GROUT 30 grout is an easy-to-use bentonite-grouting composition containing high-swelling, sodium montmorillonite clay. It is designed for use in water wells and monitoring wells, for sealing the annular space around the well casing, and for plugging drilled holes and abandoned wells. SMOOTH GROUT 30 grout contains no organic additives or polymers.

A one-sack formulation of SMOOTH GROUT 30 grout mixes with freshwater to yield a 30% pumpable grouting slurry with an extended working time. When it sets up, the SMOOTH GROUT 30 grout develops a satisfactory seal with adequate structural strength and low hydraulic conductivity. When properly placed, the SMOOTH GROUT 30 grout composition remains flexible, rehydratable, and unstratified though heating and cooling cycles.



Applications

- Sealing and grouting casing
- Sanitary sealing in water-well construction
- Sealing in monitoring wells
- Plugging and abandoning exploration boreholes

Addition method

SMOOTH GROUT 30 grout should be mixed with freshwater to obtain maximum results. A 50-lbm [22.7-kg] sack of SMOOTH GROUT 30 grout with 14 galUS [53 L] of water makes a 30%-active-solids slurry. The viscosity and consistency of a mixed grout slurry can be modified by adjusting the amount of water used to obtain varying solids content.

1. Using a mixing device, blend one 50-lbm [22.7-kg] sack of SMOOTH GROUT 30 grout into 14 galUS [53 L] of freshwater.
2. Blend, do not over mix. The resulting slurry should look like cake batter. Pump through tremie line without delay.

SMOOTH GROUT 30 Grout at Various Solids Content

Smooth grout, 30 lbm [kg]	Water, galUS [L]	Solids content, %	Useable slurry, galUS [L]	Estimate working time, min
50 [22.7]	14 [53]	30	17 [64.4]	30–60
50 [22.7]	15 [56.8]	28.6	18 [68.1]	15–30
50 [22.7]	16 [61]	27.3	19 [72]	5–15

TACKLE

Low-molecular-weight polymer additive

NSF Certified to NSF/ANSI 60

Advantages

An effective deflocculant in freshwater, KCl, and seawater fluids:

- Thermally stable to >400 degF [>204 degC]
- Not subject to bacterial degradation
- Effective in weighted or unweighted fluids and compatible with both nondispersed and dispersed systems
- Works well as a deflocculant in POLY-PLUS high-molecular-weight liquid clay inhibitor
- Compatible with most common mud additives
- A concentrated liquid thinner, easily added to the mud system through the mud hopper or directly into the surface system

Limitations

Highly anionic additive precipitated by high concentrations of divalent cations such as calcium and magnesium. Total hardness must be maintained below 200 mg/L with soda ash.

- Should not be used in calcium systems such as lime, gyp, or untreated seawater muds that have high soluble calcium
- Effectiveness is limited in high-solids mud
- Initial treatments with TACKLE* Low-molecular-weight polymer additive can actually increase viscosity when the concentration is very low, ^0.1 lbm/bbl [^0.3 kg/m^3]. Dilution to reduce the solids, in conjunction with continued treatments with TACKLE additive, reduces viscosity
- Pilot tests are recommended prior to treating with this product

Typical Physical Properties	
Physical appearance	Amber to brown liquid
Specific gravity	1.2 to 1.3
Solubility	>212 degF [>99 degC] (PMCC)

TACKLE additive is a low-molecular-weight, anionic thinner designed to deflocculate a wide range of water-based drilling fluids. This concentrated aqueous product has proven itself in applications from the surface to total depth. While it is frequently used as a shallow-hole thinner to knock the fluff out of spud mud, it also maintains effective performance in more complex systems. This synthetic additive has a high temperature limit and is not subject to bacterial degradation.

Applications

TACKLE additive is an effective additive for reducing and stabilizing viscosity in a wide range of systems. It is most effective in freshwater fluids that are low in soluble calcium. TACKLE additive is used most often in high-temperature applications and in low-solids, nondispersed, polymer muds such as the POLY-PLUS inhibitor. Normal treatments range from 0.1–2 lbm/bbl [0.3–5.7 kg/m^3].

Packaging and storage

TACKLE additive is packaged in 5-galUS [18.9-L] cans.
Store in a well-ventilated area away from sources of heat or ignition.

Toxicity and handling

Bioassay information is available upon request.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described in the MSDS.

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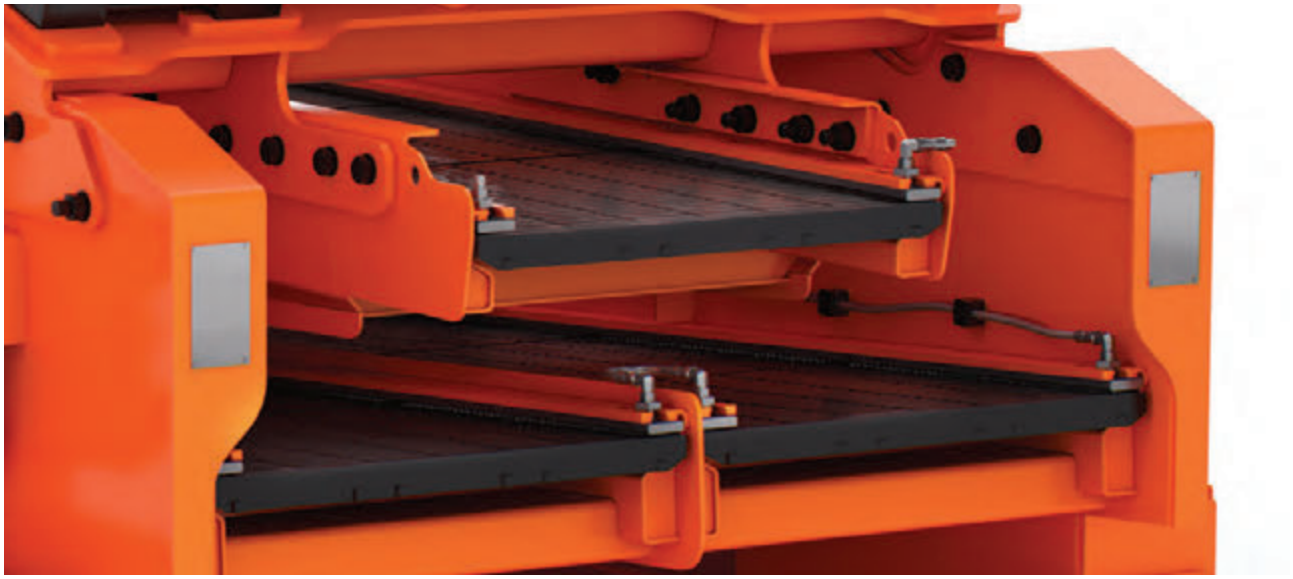
MD-2

Dual-deck shaker



The uniquely engineered MD-2* dual-deck shaker with DURAFLO* composite replacement screen has taken the solids control process to an entirely new level of efficiency.

In providing primary solids removal from both oil and water-base drilling fluids, the MD-2 dual-deck shaker delivers high-capacity separation efficiency and operational flexibility in a value-added footprint. Capable of easily switching between balanced elliptical and progressive elliptical motions, the MD-2 shaker adapts instantly to the continual changes in drilling conditions.

To further enhance its performance, the dual-deck MD-2 shaker is engineered to unlock the full solids control potential of the strong and efficient M-I SWACO DURAFLO screens. Compared to conventional shaker screens, the productive life of our DURAFLO screens is considerably longer and the overall screening area appreciably larger.

The extended useful life of composite screens in tandem with the higher capacity of a single dual-bed, flat-deck shaker assures a cost-effective and high-performing solids control package.

Features

- Dual-deck design with full primary and half-width scalping decks
- Progressive and balanced modes of elliptical motion
- Durable pretension composite screens
- Small footprint design
- Flexible fluid distribution
- Modular platform
- Select components are fabricated with durable stainless steel materials
- Adjustable deck angles
- +7 g_n operating mode
- Can accommodate most gas detection devices
- Two screen vibratory motors
- Pneumatic screen clamping and sealing system
- Vapor recovery hoods
- CE compliant

Benefits

- Delivers high processing capacities
- Adjusts instantly to changing drilling conditions
- Provides longer screen life
- Generates drier cuttings
- Enhances overall solids control efficiencies
- Conveys solids quickly out of fluid pool
- Deceases NPT
- Fits restricted space requirements
- Promotes easy deck adjustments
- Requires only marginally more power than single-deck unit
- Removes harmful vapors
- Reduces maintenance
- Lowers solid waste volumes
- Reduces drilling, waste disposal costs
- Helps ensure environmental compliance
- Raises HSE profile

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Key features

Open access to easily inspect scalping and primary deck screens

Two oilfield-proven 3.7 hp motion generators

U-shape screen clamping actuators designed with continuous toggle to enable installation from discharge end of shaker

Deck angle can be adjusted while processing fluid. Adjustment range:

- Scalping deck: –1° to +3°
- Primary deck: +3° to +7°

Composite lightweight MD series screens with self latching mechanism and integrated seal with the following gross screen area:

- Scalping deck: 16.8 ft² [1.6 m²]
- Primary deck: 33.6 ft² [3.1 m²]

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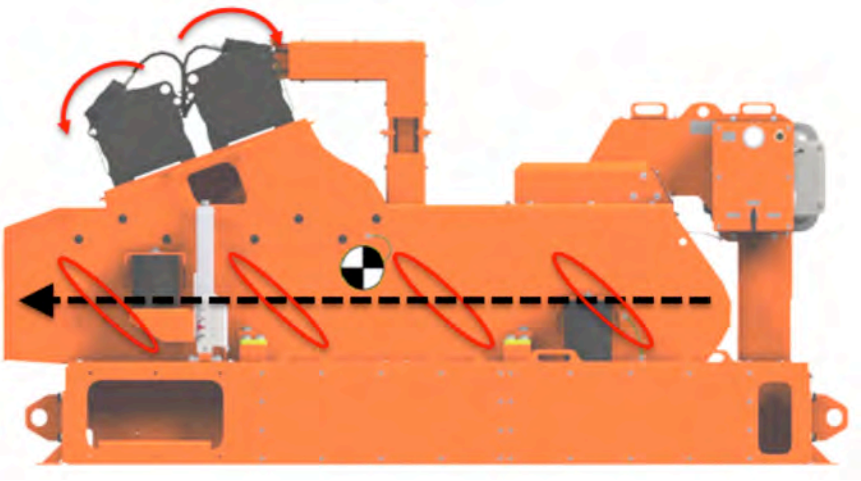
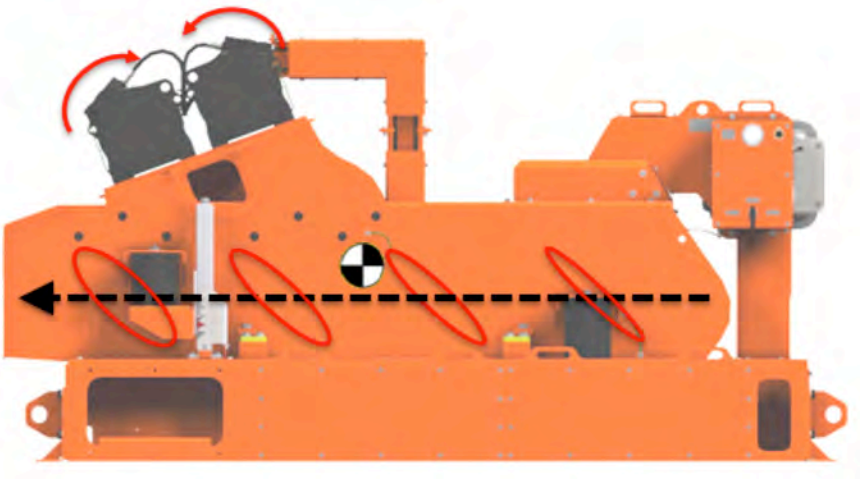
Comparison of motion



Balanced elliptical motion

- Balanced elliptical motion 7.5 g_n
- Speeds conveyance
- Increases shaker fluid capacity
- Enables shaker to process heavier solids loads
- Enhances cuttings-processing volume



Progressive elliptical motion

- Progressive elliptical motion 6.5 g_n
- Speeds conveyance
- Increases shaker fluid capacity
- Enables shaker to process heavier solids loads
- Enhances cuttings-processing volume

Basic technical specifications

Dimensions

- Length: 125 in [3,175 mm]
- Width: 74.7 in [1,898 mm]
- Height at 0°: 63.5 in [1,613 mm]
- Weir height: 39.8 in [1011 mm]
- Weight: 6,200 lbm [2,812 kg]

Screen deck and screens

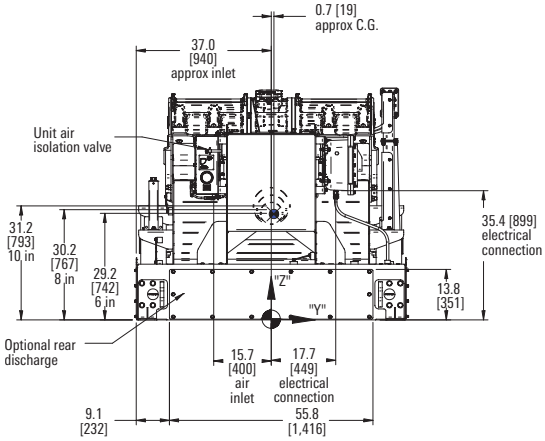
- Gross screen area:
  - Scalping deck: 16.9 ft² [1.6 m²]
  - Primary decks: 33.9 ft² [3.1 m²]
- Net [API] surface area:
  - Scalping deck: 10.6 ft² [1.0 m²]
  - Primary decks: 21.2 ft² [2.0 m²]
- Deck-adjustment system:
  - Scalping deck: +3° to –1°
  - Primary decks: +3° to +7°

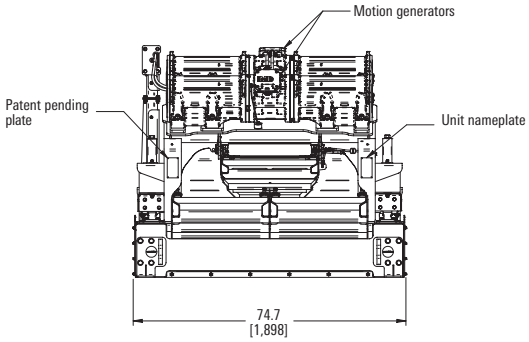
Vibratory motion type

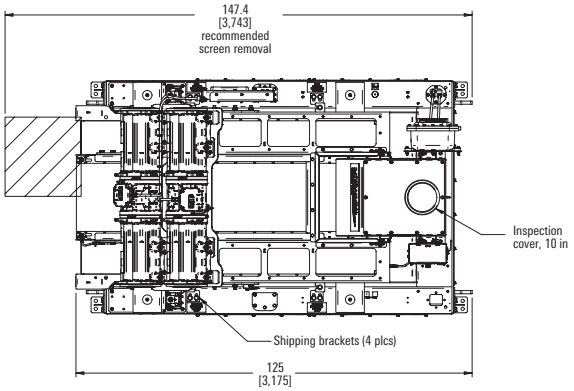
- Normal mode: 6.5 g_n
- Capacity mode: 7.5 g_n

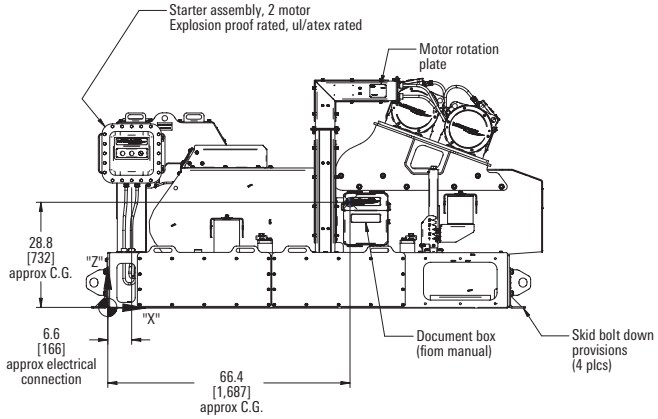
Motor specifications

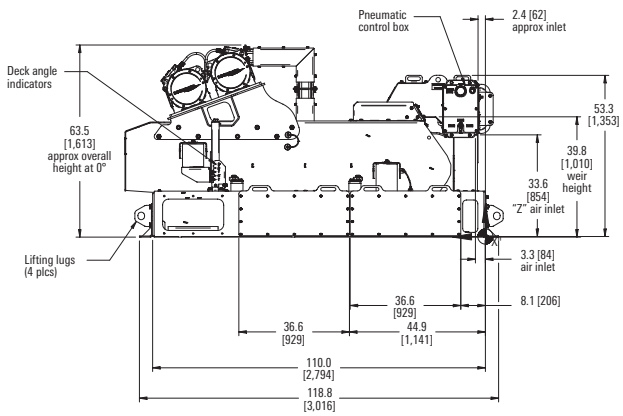
- Voltage: 220–690 VAC
- Speed: 1,800 rpm/60 Hz; 1,500 rpm/50 Hz
- Certifications: UL/cUL, CE, ATEX rated











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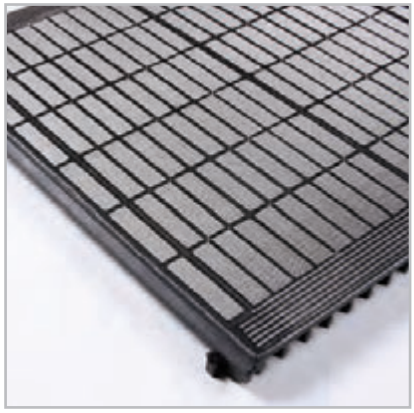
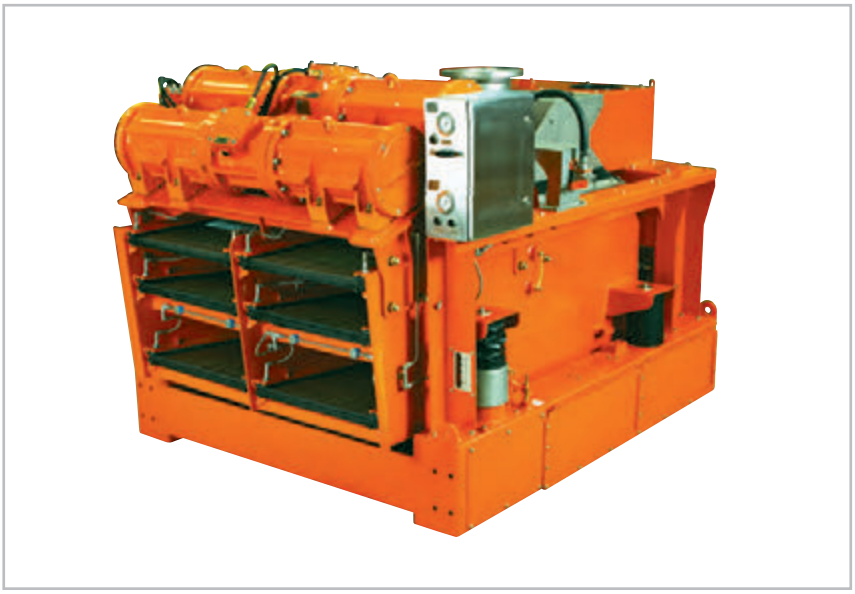
MD-3

Triple-deck shaker





M-I SWACO new-generation MD-3* triple-deck shaker offers an ideal combination of high efficiency, adaptability, and space optimization. The compact MD-3 shaker is unique in that it can adapt quickly as drilling conditions and cuttings volumes change.

Changing drilling conditions requires immediate and flexible solids control solutions. At the same time, ever-tightening environmental restrictions demand up-to-the-minute compliance. There is also the matter of high drilling costs and the need to recover expensive base fluids. In addition, offshore and some onshore locations have limited space available, demanding technologies be as compact as possible.

The MD-3 shaker meets all those requirements and more. The advanced MD-3 shaker delivers in a small footprint and is a a high-efficiency solids control option adaptable to changing drilling conditions. The highly efficient solids removal capacity of the MD-3 shaker translates to lower waste volumes, costs, and downtime. What's more, by generating drier cuttings at reduced volumes, the MD-3 shaker cuts your environmental footprint and associated coats.

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Features

- Progressive and balanced modes of elliptical motion
- Unique feeder assembly that presents fluid to the scalping screens as a uniform, low-impact curtain. Feeder easily can be configured into a variety of connection points for installations with limited space
- High-capacity operating mode for increased capacity and conveyance rate
- Efficiency operating mode for increased fluid recovery, discard dryness, and screen life
- Vibratory motion drive in two modes (6.3 and 7.2 g_n) produces a drier cuttings discharge and results in improved separation efficiency
- Vibratory motion drive enables operating modes to be switched while shaker is in motion
- Heavy-gauge carbon-steel construction and 316 L stainless steel on high-wear areas reduce maintenance costs and ensure long service life
- Fluid distribution designed to utilize all available screen area, regardless of drilling conditions
- Modular platform to accommodate a variety of features
- Available in common power supply configurations to meet all applicable global electrical standards
- Deck-adjustment system capable of adjustment while processing fluid
- Fume-extraction hood reduces operator exposure to vapors associated with drilling fluids and prevents fluid splashing outside the shaker boundaries
- State-of-the art motion generators are oilfield proven and require minimal maintenance
- Standard spray bar assists conveyance of heavy or sticky solids on scalping deck during various formations

Advantages

- Produces drier cuttings
- Extends screen life
- Minimizes HSE footprint
- Lowers waste volume
- Reduces costs
- Requires less rig space

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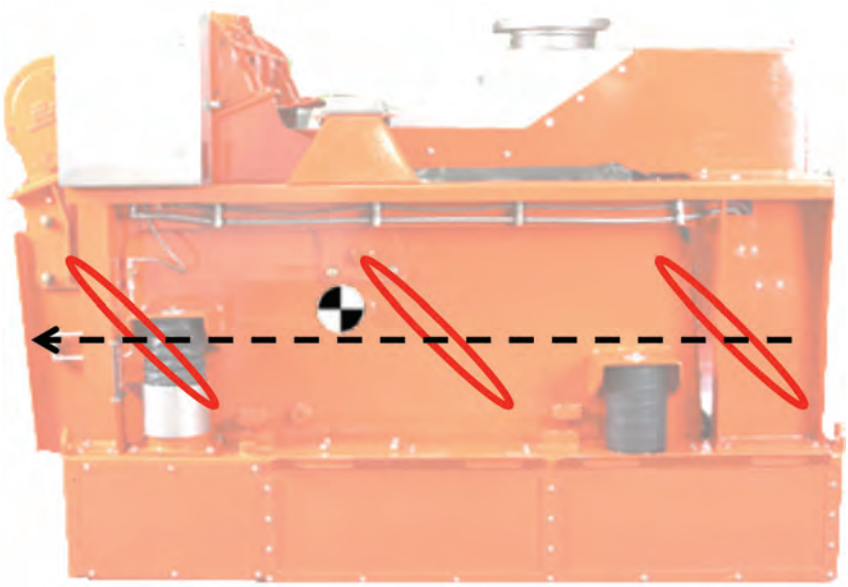
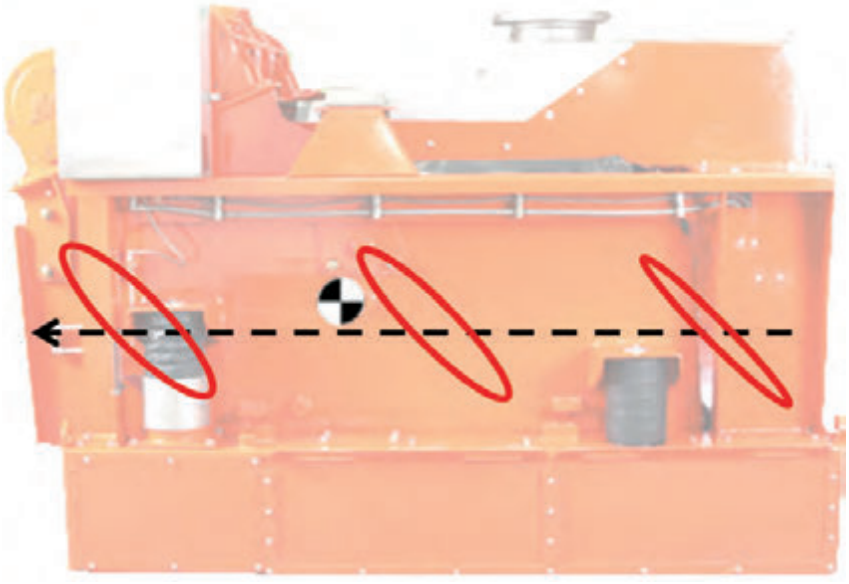
Comparison of motion



Balanced elliptical motion

- Balanced elliptical motion 7.2 g_n
- Speeds conveyance
- Increases shaker fluid capacity
- Enables shaker to process heavier solids loads
- Enhances cuttings-processing volume



Progressive elliptical motion

- Reduces g-forces (6.3 g_n maximum)
- Optimizes solids removal
- Maximizes drilling fluid recovery
- Drier cuttings
- Extends screen life

Available configurations

- Series mode for applications where wellbore strengthening materials are used
- Parallel mode for increased fluid capacity
- Mud cleaner using two or three 12-in D-SANDER* high-volume desanding cleaner cones and six, eight, or ten 4-in D-Silter twin cones

Basic technical specifications

Dimensions (parallel mode)

- Length: 103.2 in [2,621 mm]
- Width: 77.4 in [1,967 mm]
- Height at 0°: 67.7 in [1,720 mm]
- Weir height: 45.5 in [1,156 mm]
- Weight: 6,450 lbm [2,926 kg]

Dimensions [series mode with recovery trough]

- Length: 113.5 in [2,882 mm]
- Width: 77.4 in [1,967 mm]
- Height at 0°: 67.7 in [1,720 mm]
- Weir height: 45.5 in [1,156 mm]
- Weight: 6,780 lbm [3,075 kg]

Screen Deck and screens

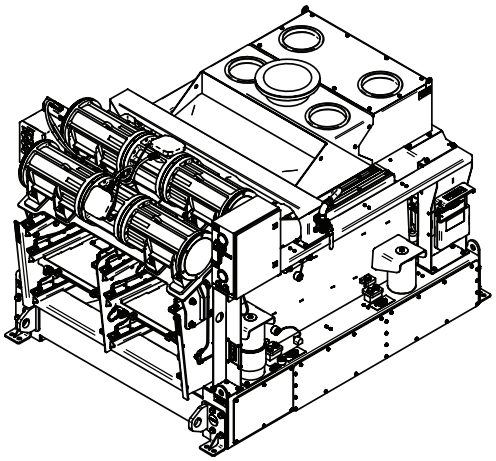
- Gross screen area:
  - Scalping deck: 25.4 ft² [2.4 m²]
  - Primary decks: 50.8 ft² [4.7 m²]
- Net [API] surface area:
  - Scalping deck: 15.8 ft² [1.5 m²]
  - Primary decks: 31.7 ft² [2.9 m²]
- Deck-adjustment system:
  - Scalping deck: +3° to –1°
  - Primary decks: +4° to +8°

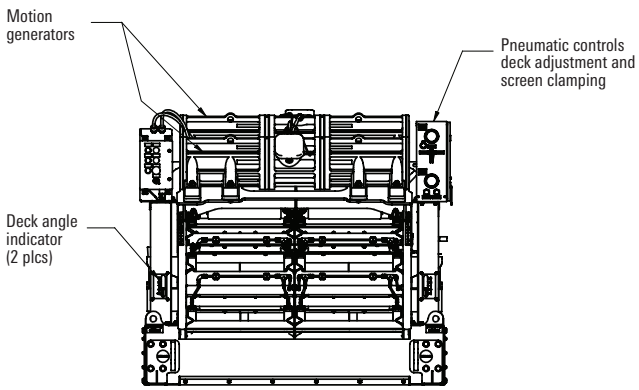
Vibratory motion type

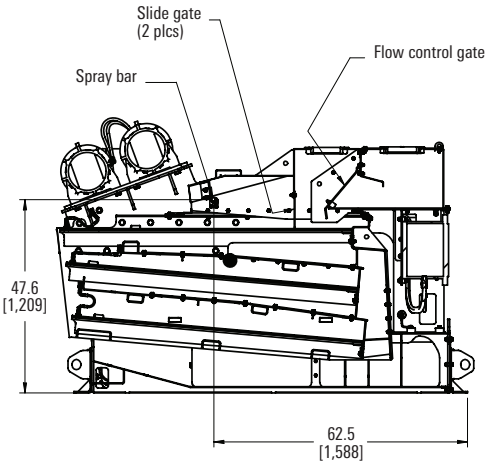
- Normal mode: 6.3 g_n
- Capacity mode: 7.2 g_n

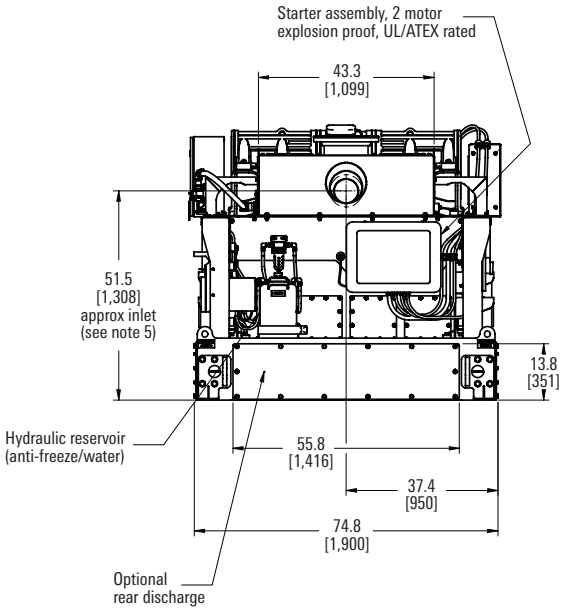
Motor specifications

- Voltage: 220–690 VAC
- Speed: 1,800 rpm/60 Hz; 1,500 rpm/50 Hz
- Certifications: UL/cUL, CE, ATEX rated









◀ BACK

MONGOOSE PRO

Dynamic dual-motion shaker

Features

- Dual motion balanced elliptical and progressive elliptical
- Motion change during operation at the flip of a switch
- Two 2.5 hp motion generators
- Increased screen access
- Heavy duty, reliable, mechanical deck adjustment system. Jacks with corrosion-resistant coating
- Large capacity distribution box
- Utilizes high-tension composite screens
- Ultratight seal between screen and screen bed
- Largest nonblanked screen area among shakers of similar footprint: 21.2 ft² [1.97 m²]

Benefits

- Balanced elliptical motion in capacity mode provides increased fluid capacity and solids conveyance rate
- Progressive elliptical motion in efficiency mode for increased fluid recovery, discard dryness, and screen life
- Rugged design and simple operation reduce maintenance costs
- Lightweight composite screens allow quick screen change out
- Screen to shaker seal eliminates solids buildup and costly solids bypass
- Easier access for quicker and safer screen changes and screen inspections
- Continuous shaker operations when switching between motions

The flexibility of dual motion

With the new generation MONGOOSE PRO* dynamic dual-motion shaker, M-I SWACO has combined balanced and progressive elliptical motion technology for a shaker that adapts as drilling conditions change.

Simply flipping a switch on the control box reconfigures the shaker from balanced to progressive elliptical motion.

There is no need to suspend or shut down operations. With the MONGOOSE PRO shaker operating in the gentler progressive elliptical mode, solids encounter reduced g-forces and longer screen residence time.

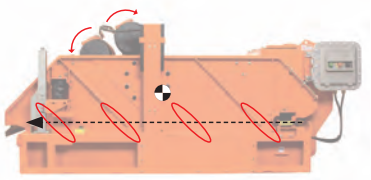
This results in drier solids, improved drilling fluid recovery, longer screen life, and reduced operating costs.

The economy of elliptical motion

The MONGOOSE PRO shaker in balanced elliptical mode is especially effective while drilling tophole sections where heavy, high-volume solids usually are encountered. In these intervals, shakers need to generate high g-forces to effectively move dense solids across the screens. During drilling breaks and increased viscosity the balanced elliptical motion eliminates the need for screen changes as well as losses.

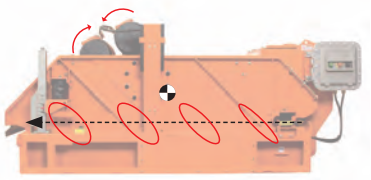
Comparison of balanced and progressive elliptical motion

Balanced elliptical motion



- Balanced elliptical motion 7.5 g_n
- Speeds conveyance
- Increases shaker fluid capacity
- Enables shaker to process heavier solids loads
- Enhances cuttings-processing volume

Progressive elliptical motion



- Reduces g-forces (6.5 g_n maximum)
- Optimizes solids removal
- Maximizes drilling fluid recovery
- Drier cuttings
- Extends screen life

Composite screens provide longer life and more screen area

M-I SWACO high-capacity composite shaker screens are the most rugged, long-lasting, and efficient screens available. The new composite screens, unique in the industry, provide resistance to corrosive drilling fluids. The screens also offer significant fluid capacity, excellent resistance to blinding, drier solids discharge, and a large net usable screen area.

Composite construction creates an ultratight seal between the screen and screen bed and eliminates solids buildup and costly solids bypass. The unique screen-locking mechanism wedges the screen firmly in place and allows the screen to be removed for repair or replacement.

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MEERKAT PT

Dual-motion shaker

The flexibility of dual motion

The dual-motion shaker that adapts as solids change

M-I SWACO has combined linear and balanced elliptical motion technology to create the revolutionary MEERKAT PT* dual-motion shaker. The design incorporates a 0.6 hp vibrator motor that allows it to perform on an unparalleled level.

But as drilling conditions change, the MEERKAT PT dual-motion shaker can be adjusted. Simply flipping a switch on the control box reconfigures the shaker from linear to balanced elliptical motion. There is no need to suspend or shut down operations. With the MEERKAT PT shaker operating in the gentler balanced elliptical mode, solids encounter reduced g-forces and longer screen residence time. This results in drier solids, improved drilling fluid recovery, longer screen life, and reduced operating costs.

The economy of linear motion

The dual-motor MEERKAT PT dual-motion shaker is especially effective while drilling tophole sections where heavy, high-volume solids are usually encountered. In these intervals, shakers need to generate high to effectively move dense solids across the screens.

The M-I SWACO MEERKAT PT shaker represents the latest developments in compact, modular design and the flexibility for multiple configurations to meet a wide range of customer requirements and rig environments.

This brochure is a reference to the two standard configurations of the MEERKAT PT shaker:

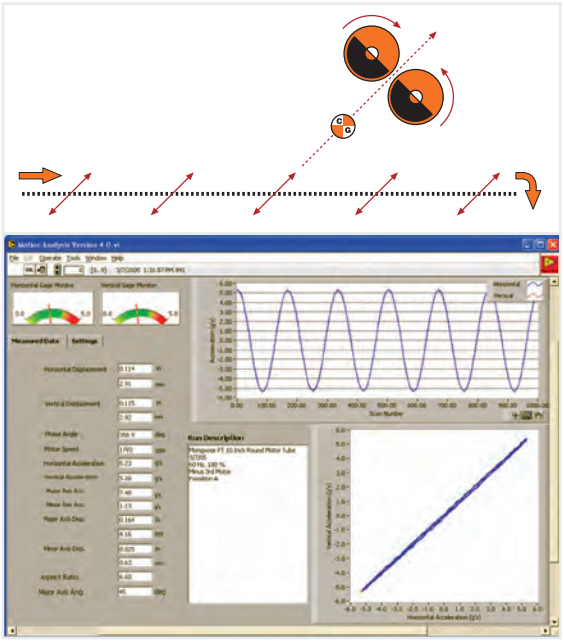
- Standard MEERKAT PT shaker with header box
- Standard MEERKAT PT low-profile shaker with possum belly

All motor specifications (hp, voltage, and speed) are nominal values and may vary with configurations. Additional nonstandard configurations of the MEERKAT PT shaker will be made available upon customer request.

Features and advantages

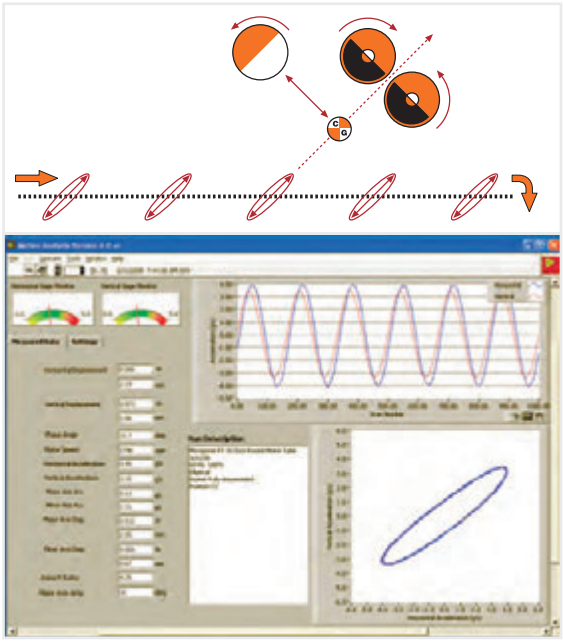
- Units can be customized to meet both tight-space requirements and high-performance criteria
- All configurations are compact and modular
- Linear motion for fast conveyance and heavy loading; balanced elliptical motion for maximum retention time and drier cuttings
- Elliptical motion at the flip of a switch without stopping the shaker
- Balanced basket functions flawlessly in either linear or balanced elliptical mode, with dry, light loads or wet, heavy loads
- Most reliable mechanical jacking system in the industry—simple and easy to use; requires no pinning
- Unique distribution box option can replace flowline possum belly, providing increased handling capacity and dampening the velocity of fluid from the flowline
- Pretensioned composite screens for fast screen changes and overall ease of use
- Ultratight seal between screen and screen bed eliminates solids buildup and costly bypass of solids
- Largest net-usable screen area among shakers of similar footprint: 15.9 ft² [1.5 m²]

Linear motion



- G-force linear motion up to 6.9 g_n
- Speeds conveyance
- Increases shaker fluid capacity
- Enables shaker to process heavier solids loads
- Enhances cuttings-processing volume
- Uniform elliptical motion at all points on basket

Balanced elliptical motion



- Reduces g-forces (5.7 g_n maximum)
- Optimizes solids removal
- Maximizes drilling fluid recovery
- Drier cuttings
- Extends screen life

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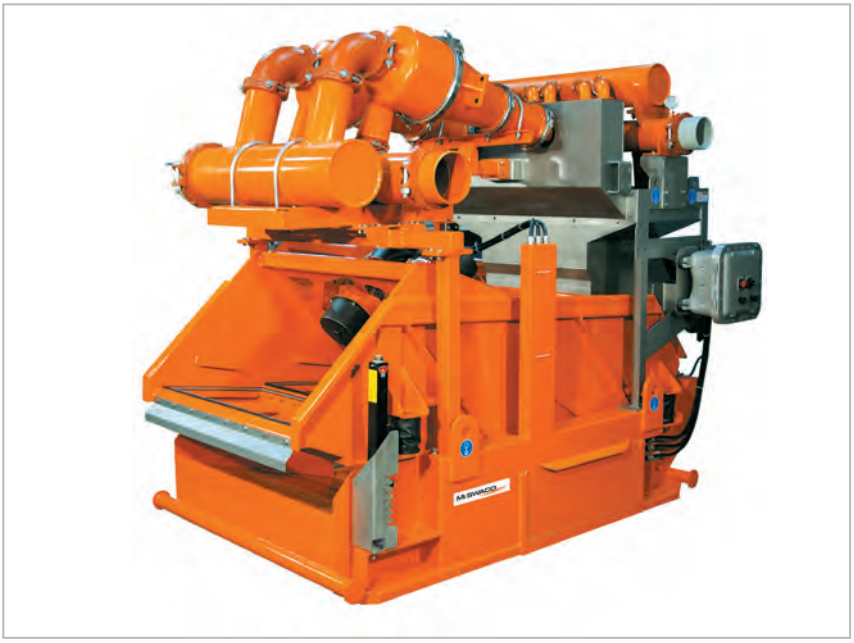
High-Volume Mud Cleaners



Features and advantages

- Assists with environmental compliances
- Cuts downtime and reduces repair
- Complete product line provides diverse configuration options
- Field-proven performance
- Lowers drilling fluid and disposal costs
- Minimizes maintenance on downstream equipment
- Compatible with oil- or water-based muds
- Effective in controlling drilled solids and retaining expensive barite

The M-I SWACO line of mud cleaners consists of a two-stage separation process using a combination of hydrocyclones mounted over a shaker to operate as a single unit. Designed to handle the entire circulating volume, mud cleaners are effective on both weighted and unweighted drilling fluid systems in removing and drying solids while retaining the expensive liquid. The hydrocyclones make the primary separation with underflow directed onto the shaker's vibrating screen. Used correctly, the M-I SWACO mud cleaners lower both drilling fluid and disposal costs.

Versatile

M-I SWACO mud cleaners can be configured with an M-I SWACO D-SILTER* high-volume desilting cleaner, a D-SANDER* high-volume desanding cleaner or both over a high-performance shaker to process weighted or unweighted drilling fluid systems.

Environmentally efficient

Removing and drying drilled solids helps meet environmental regulations by minimizing waste generated and reducing disposal costs.

Minimizes maintenance

Continuous removal of sand and abrasive cuttings from drilling fluids cuts downtime and reduces repair and replacement of worn parts on downstream equipment.

Wide range of mud cleaners for your drilling fluid system

M-I SWACO mud cleaners are available in a variety of configurations.

The Model 6T4 (12 clone), Model 8T4 (16 clone) and Model 10T4 (20 clone) D-SILTER cleaners, when matched with an M-I SWACO shaker, provide processing rates from 900 to 1,500 galUS/min [3,406.9 to 5,678.1 L/min]. The Model 2-12 D-SANDER cleaner, when matched with an M-I SWACO shaker, provides processing capabilities to 1,000 galUS/min [3,785.4 L/min].

The three-in-one Model 2-12 D-SANDER cleaner and Model 6T4 (12 clone) D-SILTER cleaner mounted over an M-I SWACO high-performance shaker provides the most versatile separation combination package with rates of 1,000 and 900 galUS/min [3,785.4 and 3,406.9 L/min], respectively.

Works with oil- or water-based muds

M-I SWACO mud cleaners are designed to work with either oil- or water-based weighted muds, as well as with either dispersed or nondispersed muds. They are also effective on unweighted drilling fluid systems, removing fine drilled solids while retaining expensive liquid phases. Field-proven M-I SWACO mud cleaners are especially effective in controlling drilled solids and retaining expensive barite when used in conjunction with M-I SWACO fine-screen shakers and centrifuges.

How it works

Mud cleaners combine a hydrocyclone system with a shaker to help remove the fine drilled solids from the drilling fluid.

Together, they have the capability to process the entire drilling fluid circulation volume and remove drilled solids from weighted mud systems, retaining expensive barite and liquids and economically reducing hole problems associated with excessive drilled solids. Drilling fluid passes through a series of hydrocyclones—either D-SILTER* high-volume desilting cleaner or D-SANDER* high-volume desanding cleaner—that separate the fine, light particles from the heavy, coarse particles. Barite and other heavy drilled solids are then carried in the underflow to a 100- to 200-mesh vibrating screen. There, they are separated, with the barite passing through the screen and returning to the active system.

The M-I SWACO D-SILTER cleaner features the exclusive polyurethane TWIN SWACONE* D-SILTER cones with a unique 20° taper angle (compared with the 15° taper angle on most other units). The twin-cone design provides a 50% greater capacity than other 4-in [102 mm] cones.

The M-I SWACO D-SANDER cleaner models 2–12 and 3–12 are designed to remove sands and abrasive cuttings—95% of all particles to 74 um and more than 50% of particles to 40 um.

The D-SANDER cleaner features your choice of two or three 12-in [304.8 mm] diameter replaceable, wear-resistant, polyurethane hydrocyclones and quick-release stainless-steel clamps for simplified changeout.

These high-volume mud-cleaner product combinations provide drillers a wide range of efficient, space-saving processing options including connection to centrifuges for barite recovery.

Mud cleaners can be installed on the single, dual, and triple configurations:

- The D-SANDER cleaner is available in two- or three-cone
- The D-SILTER cleaner is available in six, eight, or ten twin-cone
- Low profile (approx. 64 in [1,626 mm] to top of trough)
- Integral bypass between shaker and D-SILTER cleaners and D-SANDER cleaners
- Compact footprint
- Allows inspection and maintenance without ladders or scaffolds
- Operates as D-SILTER cleaners and D-SANDER cleaners and flowline shaker independently

MEERKAT PT shaker.

◀ BACK

DURAFLO

Composite replacement screen

The composite evolution began with our first generation, patented, HiFlo screen. It was the first to use a grid made from a composite of high-strength plastic and glass, reinforced with high tensile strength rods. Today's evolutionary composite DURAFLO* composite replacement screens deliver even longer screen life and greater ease in making repairs, giving way to an overall more robust product.

Longer screen life

The composite frame design encompasses the window pane effect of incorporating an increased number of smaller panels, thereby evenly distributing mechanical stresses and containing mesh damage to small localized areas.

Reduced screen weight

The DURAFLO screen weighs about the same as our first generation composite, HiFlo. However, it weighs up to 40% less than traditional metal framed screens. Lower screen weight gives way to enhanced shaker g-force.

Easy screen repair

The patented SNAP-LOK* plug screen-repair system reduces repair time to less than 2 minutes. By simply inserting a factory made plug, this system eliminates the need for cutting and gluing damaged cells. This equates to reduced rig time for solids control equipment service and maintenance.

Features and benefits

- Patented, composite frame design
- Available for M-I SWACO, Brandt, Derrick, and Axiom brand shakers
- Increased number of smaller flow panels for enhanced durability
- Consistent screen open area
- Less weight than metal-frame screens
- Featuring the SNAP-LOK system
- Composite screen offers chemical resistance and environmental degradation
- Consistently manufactured, rugged construction
- Increased operational life
- Lower overall screen costs due to fewer required replacements
- Quick and easy to repair
- Less downtime
- Resistant to rust and delamination caused by chemical and environmental exposure
- Improved QHSE considerations

^NOV Brandt and VSM 300 are marks of Varco I/P, Inc.

Composite OEM and Replacement Screens

Features and advantages

- Available for M-I SWACO BEM-600, BEM-650 and MONGOOSE PT, MEERKAT PT and MD-3 shale shakers and NOV Brandt VSM 300 brand shakers
- Patented, composite frame design
- Smaller, more numerous panels
- More open area than metal-frame screens
- Less weight than metal-frame screens
- Snap-Lok system for the BEM-650 and NOV Brandt VSM 300 shakers
- Screen is resistant to fluids that shorten metal-framescreen life
- Consistently manufactured, rugged construction
- Increased operational life
- Lower screen replacement costs
- Quick and easy to repair
- Less downtime
- Does not rust or delaminate
- Improved QHSE considerations

^NOV Brandt and VSM 300 are marks of Varco I/P, Inc.

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DURAFLO composite screens

The evolution of the composite-frame shaker screen began with the patented HIFLO* screen, which was the first to use a grid made from a composite of high-strength plastic and glass reinforced with high-tensile-strength steel rods. Today's patented DURAFLO* composite replacement screens are the next evolutionary step, delivering even longer screen life and greater ease in making repairs than metal-frame screens. The DURAFLO screen is available with HC, ultrafine, TBC, and XR MESH* shaker screen mesh, giving operators screening flexibility in addition to an improved product.

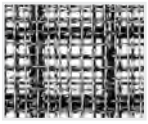
Easy to repair

The patented[1] SNAP-LOK* plug screen-repair system, available on DURAFLO screens for the Brandt VSM 300 shaker, reduces repair time to less than 2 min. Simply remove the screen from the shaker and snap in a factory-made plug. This system eliminates the need for removing the damaged mesh and requires no cutting, gluing, or bonding time.

Three different screen meshes

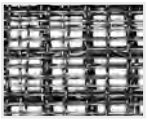
With the DURAFLO frame as a solid base, M-I SWACO offers four different meshes that let you choose the right mesh for the job without sacrificing long life, throughput capacity, or any of the other DURAFLO screen advantages.

XR MESH shaker screen mesh



Larger-diameter wire gives XR MESH screens the longest life in the industry today. Combining XR MESH screens with the DURAFLO composite frame technology allows for exceptionally high fluid-handling capacity. The high conductance also results in reduced mesh loading in comparison to standard mesh types, further ensuring unmatched screen life.

Ultrafine mesh for sandstone



The Ultrafine (XL) screen has been specifically designed to cope with drilling sandstone formations, which can typically present blinding problems when using standard screen meshes.

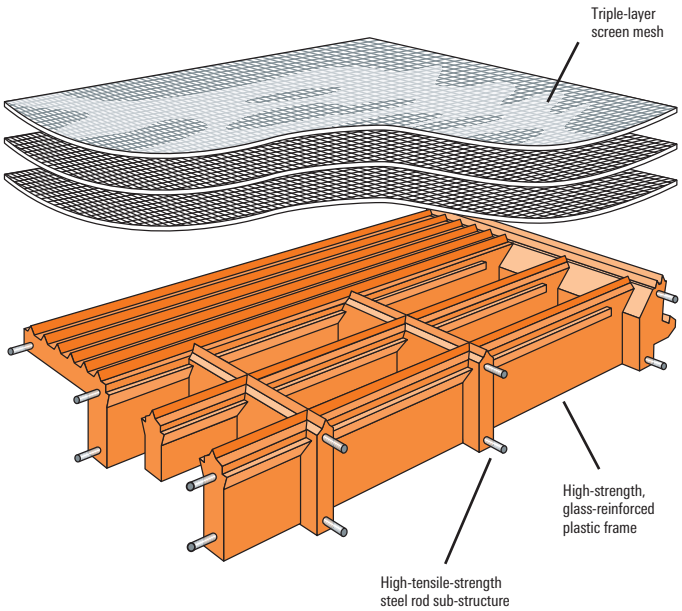
High-capacity (HC) mesh

HC (high-capacity) mesh is another layered rectangular mesh that M-I SWACO manufactures, although it is not patented. The diameter of the wire used to make HC mesh is smaller than the wire used to make XR MESH, and the mesh is not calendared. Compared with XR MESH, HC mesh has more open area and therefore more capacity, but it has a shorter screen life and lower separation efficiency.

The anatomy of the three-layer DURAFLO screen

DURAFLO[†] screen frames consist of a grid made from a composite of high-strength plastic and glass reinforced with high-tensile-strength steel rods. Because these frames balance durability with strength, they are more efficient transport mechanisms than steel frames in several ways. DURAFLO screens have higher throughput capacities and significantly longer operational lives. They do not rust or delaminate, so they can be used, stored, and reused. Model for model, composite frames weigh less than all-steel frames. And they have an increased open area, providing a higher conductance rate.

Patented[‡] DURAFLO composite frame technology, combined with four different screen meshes, lets you choose the right mesh for the job without sacrificing long life, throughput capacity or any of the other composite screen advantages.



[†] U.K. Patent No. GB 2,379,177.
[‡] U.K. Patent No. GB 2,322, 590; U.S. patents pending.

DURAFLO

Composite replacement screen for M-I SWACO shakers

The high-capacity composite screens from M-I SWACO are the most rugged, long-lasting, and efficient screens available.

Composite screens are unique in the industry and provide chemical resistance and delamination to corrosive drilling fluids. Our patented technology offers significant fluid-handling capacity, blinding resistance, drier solids discharge, and an overall larger net usable screen area. The precision molding process produces an increased number of smaller, more precise panels.

Our integrated sealing mechanism creates an ultratight seal between the screen and bedding plane, thereby eliminating solids buildup and costly solids bypass. A cleaner mud increases drilling efficiency, reduces skin damage, and enhances production.

For MONGOOSE series shakers

The DURAFLO* composite replacement screen for MONGOOSE series shakers (including MEERKAT* compact single-deck shakers) features a unique wedge mechanism for screen locking. The composite construction combined with the efficient and easy locking mechanism eliminates solids bypass which gives way to costly required fluid dilutions. In addition, it allows easy screen removal, repair, or replacement.

For BEM series shakers

The DURAFLO OEM screen for M-I SWACO BEM-600† and BEM-650† shakers takes the best screen and matches it to the best balanced elliptical motion shakers on the market. Featuring a patented, composite frame design that holds up under virtually all drilling conditions, the screen delivers unsurpassed usable screen area. DURAFLO screens are available with HC, ultrafine (XL) and XR MESH* shaker screen mesh, giving operators maximum screening flexibility.

For MD series shakers

The MD shakers and screens were designed in tandem to take full advantage of the technology available through the use of composite materials while maximizing shaker performance.

The DURAFLO for MD series shakers feature a novel self-latching design that maintains screen-to-screen seal. This allows screens to be removed as a unit instead of individually, with no tools required.

Features and benefits

- Composite material, resistant to chemical degradation
- Integrated sealing mechanism eliminates bypass
- Easy installation and removal using patented interlocking system
- Light-weight
- Enhanced fluid-handling capacity
- Comolded gasket design
- Improved QHSE profile
- Easily repairable
- Blinding resistance

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518 HV

High-volume, high-speed decanting centrifuge

The 518 HV* high-volume, high-speed decanting centrifuge is a unit which replaces the operation of two standard 518 centrifuges combined through an increased fluid-handling capacity and improved solids separation.

The 518 HV centrifuge is designed to handle higher fluid processing rates by providing more power and improving the fluid flow in and out of the machine.

Increasing the available power for the main (50 hp) and back drive (15 hp) allows more fluid to be fed into the bowl while providing the necessary torque to remove the increased solids load resulting from the higher feed rate.

The unit also has an improved fluid accelerator to reduce turbulence and bring the fluid velocity (both magnitude and direction) up to the bowl rotating speed and direction as quick as possible, thus reducing the energy consumed for fluid acceleration and reserving more energy for solids conveyance.

The unit contains a quasi-axial flow scroll which increases the flow area inside the bowl thus reducing the fluid velocity and hence, the onset of turbulence.

Features

Performance

- Quasi-axial scroll
- Tungsten carbide tiles (scroll)
- High bowl speed
- Variable bowl and scroll speed (1)
- Fixed bowl and differential speed (2)
- Variable feed pump speed
- Split pillow blocks
- Stainless steel rotating assembly
- Perfectly balanced rotating assembly
- PLC control (1)

Safety

- Vibration sensor
- Torque limiter
- Micro switches on vessel and guards
- Bearing temperature sensors (1)
- Pressure sensors (3)
- Hydraulic oil temperature sensor (3)
- Speed sensors (3)

Benefits

Performance

- Quasi-axial scroll provides an increased flow area which minimizes the turbulence
- Increased flights wear resistance thereby reducing maintenance requirements
- High bowl speed assures a high g-force, solids removal efficiency percentage, and finest cut points.
- Complete control of g-force and differential settings for improved separation efficiency
- Six bowl speed/differential combinations on fixed drive units for enhanced simplicity and efficiency
- Split pillow blocks for increased protection against contamination, extended material life, and easier maintenance
- Highly corrosion resistant
- Minimal vibration and noise emissions
- Programmable logic controller (PLC) provides continues monitoring and automatic shutdown of all critical parameters while providing automatic control to avoid centrifuge plugging (1)

(1) Not applicable to Fixed Drive, (2) Only applicable to Fixed Drive, (3) Only on Fully Hydraulic Drive types

Basic technical specifications all dimensions are expressed in inches [millimeters].

Performance

- Hydraulic capacity:
  248 galUS/min [939 LPM]
- Operating speed: 3,200 rpm
- G-force: 1,975 g_n
- Sigma value: 24,326 ft^2 [2,260 m^2]
- Solids discharge: 27 galUS/min
  [6.1 m^3/h]

Rotating assembly

- Bowl diameter: 13.9 in [353.1 mm]
- Bowl length: 57.5 in [1,461.1 mm]
- Pond depth:
  2.3, 2.42, 2.54 in [58.5, 61.5, 64.5 mm]
- Scroll type:
  Single lead quasi-axial flow
- Scroll pitch: 4.31 in [109.5 mm]
- Main bearings: grease lubricated
- Internal bearings: grease lubricated
- Feed tube: open ended

Rotating assembly material

- Bowl: stainless steel duplex A890
- Scroll:
  stainless steel duplex A890 AISI 304
- Scroll flights: tiles; tungsten carbide
- Discharge bushings: tungsten carbide

Gearbox

- Type: planetary
- Gear ratio: 57:1
- Torque, maximum:
  2,531 ft-lbm [3,432 Nm]
- Differential Range:
  - Fixed drive: 10 to 79 rpm
  - VFD: 1 to 55 rpm
  - FHD: 1 to 80 rpm
- Weight: 159 lbm [72 kg]

Nozzle schedule

- Liquid discharge: 8 in victaulic
- Solids discharge:
  21.0 × 13.8 in [530 × 350 mm]
- Feed tube: 2 in NPT (male connection)

Fixed drive type

- Power: 400/460 V—50/60 Hz, 3 phase
- Main drive motor: 50 hp [37 kW]
- Back drive motor: 15 hp [11 kW]

VFD type

- Power: 400/460 V—50/60 Hz, 3 phase
- Main drive motor: 50 hp [37 kW]
- Back drive motor: 15 hp [11 kW]

FHD type

- Power: 400/460 V—50/60 Hz, 3 phase
- Main drive motor: 60 hp [45 kW]
- Hydraulic pump:
  variable displacement pump

Certification

- 518 HV (Fixed drive):
  ATEX CE Ex II 2G c IIB T3
  or UL, Class I, Div I
- 518 HV VFD:
  ATEX CE Ex II 2G c IIB T3
  or UL, Class I, Div I
- 518 HV FHD:
  ATEX CE Ex II 2G c b IIB T3
- 518 HV SL VFD:
  ATEX CE Ex II 2G c IIB T3
  or UL, Class I, Div I
- 518 HV SL FHD:
  ATEX CE Ex II 2G c b IIB T3

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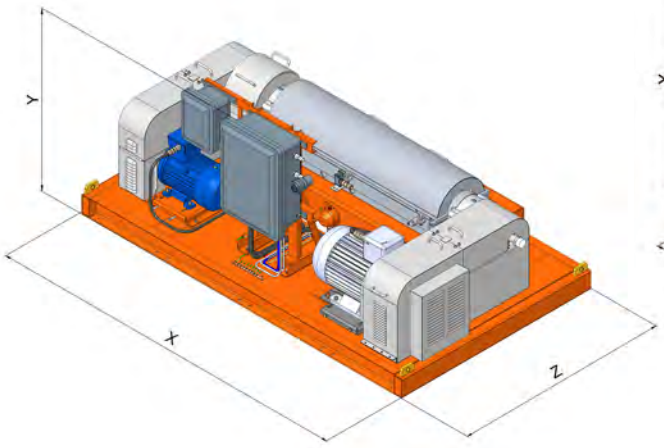
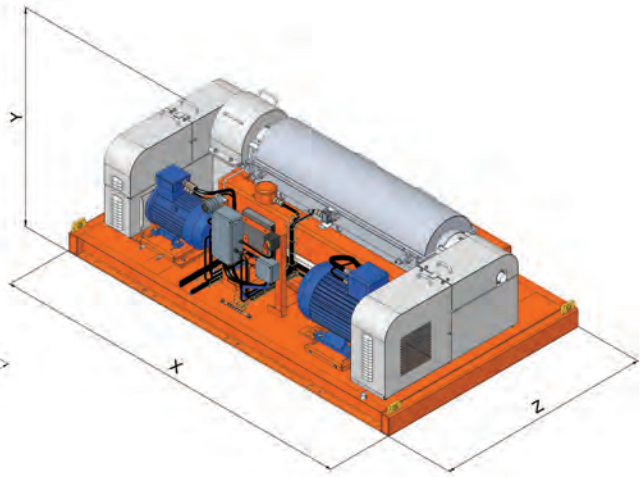
Basic technical specifications all dimensions are expressed in inches [millimeters].

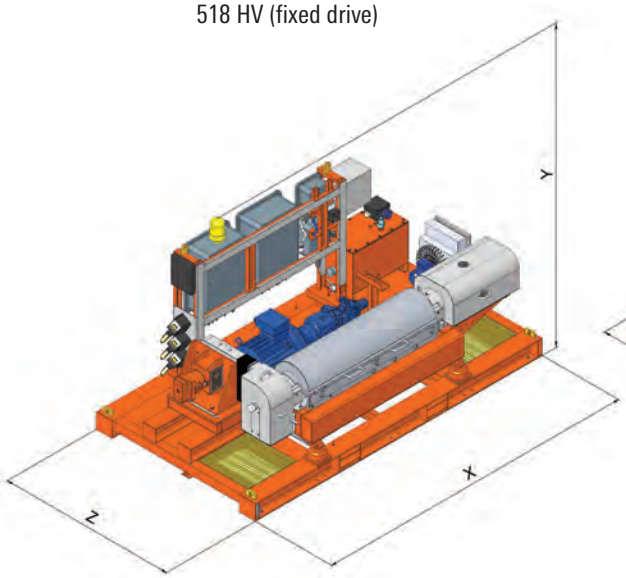
Dimensions and Weights				
	X	**Y**	**Z**	**Weight**
518 HV (Fixed drive)	119.0 in [3,023 mm]	53.3 in [1,353 mm]	70.0 in [1,778 mm]	6,173 lbm [2,800 kg]
518 HV VFD	119.0 in [3,023 mm]	34.9 in [887 mm]	70.0 in [1,778 mm]	5,291 lbm [2,400 kg]
518 HV FHD	142.0 in [3,608 mm]	70.1 in [1,780 mm]	78.7 in [2,000 mm]	10,141 lbm [4,600 kg]
518 HV SL VFD	132.6 in [3,368 mm]	65.9 in [1,674 mm]	39.4 in [1,000 mm]	5,855 lbm [2,656 kg]



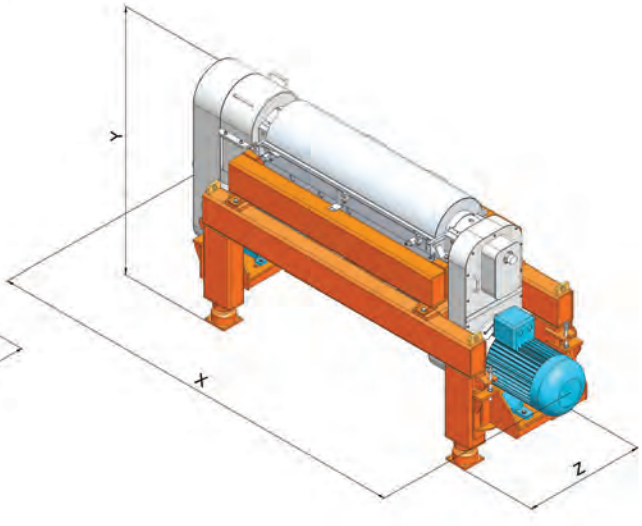
518 HV (fixed drive)



518 HV VFD



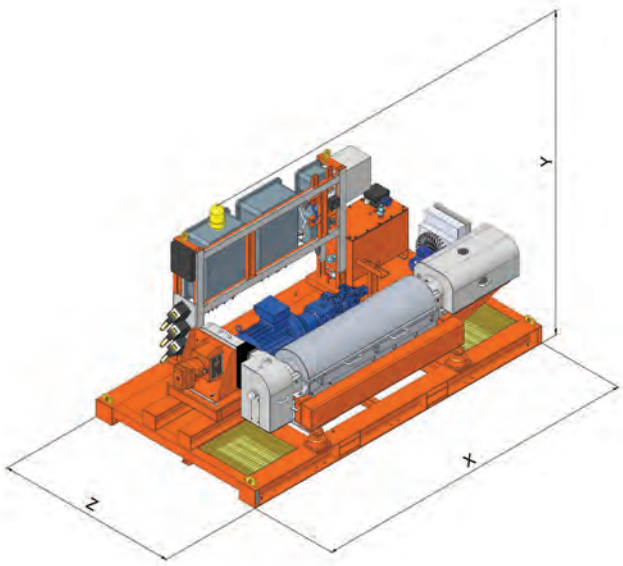
518 HV FHD



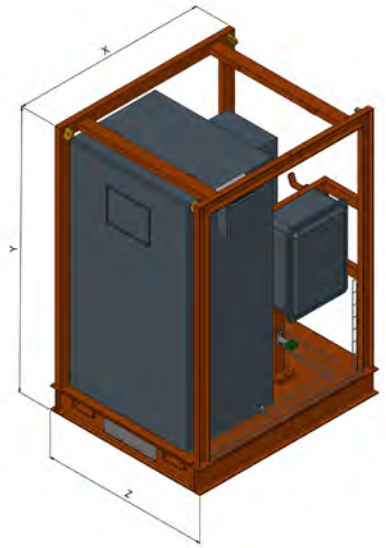
518 HV SL VFD

Basic technical specifications all dimensions are expressed in inches [millimeters].

Dimensions and Weights				
	X	**Y**	**Z**	**Weight**
518 HV SL FHD (centrifuge module)	130.5 in [3,314 mm]	59.0 in [1,499 mm]	37.0 in [940 mm]	4,850 lbm [2,200 kg]
518 HV SL FHD (hydraulic module)	96.5 in [2,450 mm]	79.7 in [2,025 mm]	50.8 in [1,290 mm]	5,512 lbm [2,500 kg]
VFD control panel (ATEX)	55.1 in [1,400 mm]	90.7 in [2,305 mm]	65.7 in [1,670 mm]	2,646 lbm [1,200 kg]



518 HV SL FHD
[centrifuge module]



VFD control panel

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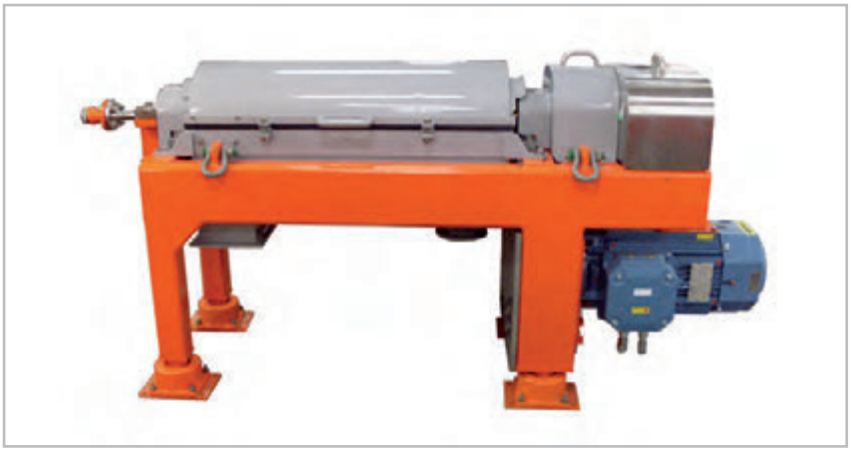
CD-250

Centrifuge



The new CD-250* centrifuge delivers maximum fluid/solid processing capacity with minimal footprint. With the industry's smallest processing power footprint, the CD-250 EDHV decanting centrifuge was engineered around the concepts of smaller size, lower weight, shorter installation and removal times, and a user-friendly control system.

Despite its comparatively smaller size, the CD-250 EDHV centrifuge processes and recovers high volumes of valuable fluid while reducing the total volume of waste. Its relative ease of installation and removal save valuable time.

By recovering more fluid and producing drier cuttings with a smaller volume, the CD-250 EDHV centrifuge helps operators reduce their waste and disposal volumes and minimize their environmental footprint.

Features

- Specially designed electric motor saves space and reduces weight
- Variable-speed bowl
  - from 0 to 4,000 rpm
- High g-forces
  - up to 2,191 g_n at 4,000 rpm
- Fine cut point
- Simple design
- High sigma value relative to the unit's overall size: Up to 1,238 m^2 at 4,000 rpm
- Optional programmable logic controller (PLC) to protect, control and optimize centrifuge performance
- Rugged construction for harsh environments
- 24/7 technical assistance

Advantages

- High-volume fluids and solids processing
- Minimal footprint
- Reduced costs
- Minimizes environmental impacts
- Easy to operate, maintain

CD-250 Centrifuge

All dimensions are expressed in inches [millimeters].

Specifications

Centrifuge

- Bowl length (internal): 941.5 mm [37.07 in]
- Bowl diameter (internal): 253 mm [9.96 in]
- Bowl speed range: 0–4,000 rpm
- Maximum g-force (with strips): 2,191 g_n (at 4,000 rpm)
- Sigma value max: 1,238 m^2
- Conveyor speed range: linked to bowl speed (26 rpm when bowl runs at 4,000 rpm)
- Conveyor pitch: 00 mm [3.94 in]
- Maximum solids discharge rate: 4.4 m^3/h [19 galUS/min]
- Hydraulic capacity (water): 17.0 m^3/h [75 galUS/min] at 4,000 rpm
- Pond set at 29 mm [1,14-in] 14.3 m^3/h [63 galUS/min] at 3,000 rpm

Gearbox and drive

- Type: Akim ZG 2400/10 Planetary Gearbox)
- Ratio: 60:1
- Max torque: 2,000 Nm [2,475 ft-lbm]
- System power: 50 kW Required (400 V at 50 Hz, 3 Ph—460 V at 60 Hz, 3 Ph)
- Drive system: variable bowl speed, not changeable differential value
- Main drive electric motor: 20 hp [15 kW]
- Control system: PLC in manual control mode

Overall dimension and weight

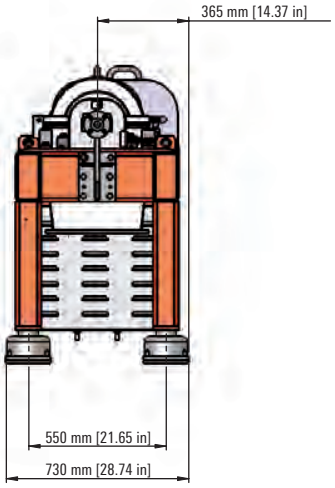
- Length X: 2,233 mm [87.91 in]
- Height Y: 1,174 mm [46.22 in]
- Width Z: 730 mm [28.74 in]
- Total weight: 1,010 kg [2,227 lbm]

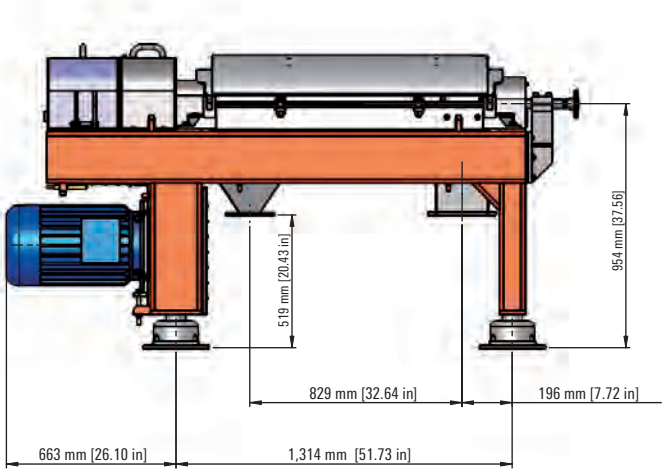
Center of gravity position

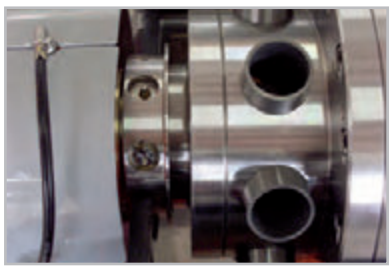
- Length XG: 1,091 mm [42.95 in]
- Height YG: 739.5 mm [29.11 in]
- Width ZG: 364 mm [14.33 in]

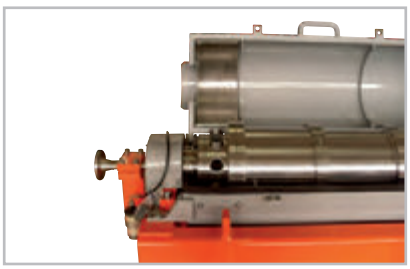
Nozzle schedule

- Feed pipe flange: 1-in WN RF ANSI 150 lb
- Liquid discharge connection flange: 1 × 7.5 in Victaulic
- Solids-discharge connection flange: 413 mm × 268 mm [16.26 in × 10.55 in]









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414 CENTRIFUGE

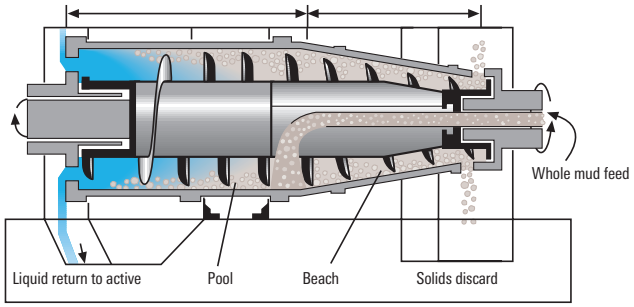
Barite-recovery decanting centrifuge

The 414 CENTRIFUGE* barite-recovery decanting centrifuge delivers high performance and low operating costs for oilfield and industrial mud and fluids-handling applications. This highly efficient decanting centrifuge recovers up to 95% of barite and returns it to the active system while rejecting finer, low-gravity solids. The advanced design of the stainless steel bowl and scroll maintains an even layer of conveyed solids for more uniform separation and maximum solids control efficiency.

The M-I SWACO 414 CENTRIFUGE—precision equipment engineered to handle rugged oilfield service.

Features and advantages

- Balanced scroll design increases recovery capacity
- Efficient operation processes up to 140 galUS/min [530 L/min] with a 6- to 10-um cut on weighted mud systems; processes up to 250 galUS/min [946.4 L/min] with a 5 to 7 um cut point on unweighted mud
- Stainless steel bowl, scroll compartment and cover to resist corrosion and abrasion
- Tungsten-carbide scroll points with wide spacing of flights at the narrow end create a finer layer of conveyed solids for more uniform separation under high g-forces
- Precision balanced to run at high rpms for extended periods with greater efficiency, minimizing maintenance and downtime
- Operating safety controls include self-limiting vibration and torque switches to protect against catastrophic failure
- Variable speed electro-hydraulic backdrive is available as an option for the 414 CENTRIFUGE
- Recovers up to 95% of barite, minimizing costly additions while maintaining prescribed mud weights
- Rejects finer, low-gravity solids from drilling fluids
- Cost-efficient operation—reduces discard volume versus dilution displacement alternatives 30 to 60% depending upon mud weights
- Ideal for use with weighted or unweighted mud systems
- Rugged construction and corrosion-resistant materials provide long service life and low maintenance costs in the toughest oilfield environments



CD-500 HV

High-volume, high-speed precision-balanced centrifuge

The CD-500 HV* high-volume, high-speed precision-balanced centrifuge is a high-powered centrifuge designed for exceptional low gravity solids (LGS) separation and barite recovery in operations where large feed rates are a requirement.

The CD-500 HV centrifuge has been designed to process large volumes of fluids, improve barite recovery, and produce solids that meet environmental regulations for disposal. Automatic PLC monitoring and adjustment compensates for varied drilling conditions and maintains maximum solids and fluids separation throughout the drilling operation.

The CD-500 HV centrifuge recovers valuable drilling fluid and barite while reducing the total volume of drilling waste that must be transported for injection, disposal or remediation.

By recovering more fluid and producing drier cuttings with a smaller volume, the CD-500 HV centrifuge helps operators reduce their drilling waste and disposal volumes.

Features

Performance

- Quasi-axial scroll
- High bowl speed
- Double feed chamber
- Open ended and slotted feed tubes
- Oil forced lubricated main bearings
- Variable bowl, scroll and pump speed
- Split pillow blocks
- PLC control
- Stainless steel rotating assembly
- Perfectly balanced rotating assembly
- Tungsten carbide tiles (scroll)

Safety

- Vibration sensor
- Torque limiter
- Micro switches on vessel and guards
- Bearing temperature sensors
- Pressure sensors (1)
- Hydraulic oil temperature sensor (1)
- Speed sensors (1)

Benefits

Performance

- Quasi-axial scroll provides an increased flow area which minimizes the turbulence for an improved separation efficiency and a high fluid-handling capacity
- High bowl speed assures a high g-force, solids removal efficiency, finest cut points, and a high clarification capacity
- Double feed chamber and open ended and slotted feed tubes assure better configuration for barite recovery or LGS removal
- Reduced bearing wear and maintenance requirements
- Complete control of g-force for improved separation efficiency
- Split pillow blocks for increased protection against contamination, extended material life and easier maintenance
- Programmable logic controller (PLC) provides continues monitoring and automatic shutdown of all critical parameters while providing automatic control to avoid centrifuge plugging

(1) Only on Fully Hydraulic Drive types

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Basic technical specifications all dimensions are expressed in inches [millimeters].

Performance

- Hydraulic capacity: 674 galUS/min [2,551 lpm]
- Operating speed: 3,200 rpm
- G-force: 2,656 g_n
- Sigma value: 49,589 ft² [4,607 m²]
- Solids discharge: 53 galUS/min [12.0 m³/h]

Rotating assembly

- Bowl diameter: 18.6 in [472 mm]
- Bowl length: 67.5 in [1,715 mm]
- Pond depth: 2.2, 2.6, 3 in [56, 66, 76 mm]
- Scroll type: single lead quasi-axial flow
- Scroll pitch: 5.12 in [130 mm]
- Main bearings: oil lubricated
- Internal bearings: grease lubricated
- Feed tube: open ended (lgs removal) slotted (barite recovery)

Rotating assembly material

- Bowl: stainless steel DUPLEX A890
- Scroll: stainless steel DUPLEX A890 AISI 304
- Scroll flights: tiles; tungsten carbide
- Discharge bushings: tungsten carbide

Dimensions and Weights

	X	Y	Z	Weight
CD-500 HV VFD	155.4 in [3,946 mm]	47.8 in [1,215 mm]	79.5 in [2,020 mm]	11,023 lbm [5,000 kg]
CD-500 HV FHD	163.2 in [4,146 mm]	90.2 in [2,290 mm]	87.4 in [2,220 mm]	14,330 lbm [6,500 kg]

Gearbox

- Type: planetary (model; ZG 3700/10)
- Gear ratio: 80:1
- Torque, maximum: 6,269 ft-lbm [8,500 nm]
- Differential range: 1 to 40 rpm
- Weight: 474 lbm [215 kg]

Nozzle schedule

- Liquid discharge: 8 in victaulic
- Solids discharge: 31.9 × 17.7 in [810 × 450 mm]
- Feed tube: 2 in [ANSI B 16.5]

VFD type

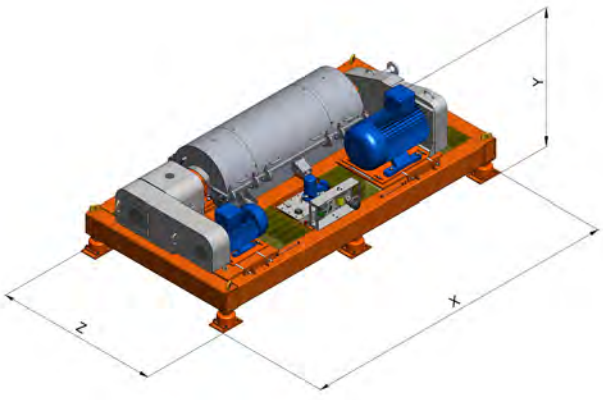
- Power: 400/460 v—50/60 hz, 3 phase
- Main drive motor: 100 hp [75 kw]
- Back drive motor: 30 hp [22 kw]

Fhd type

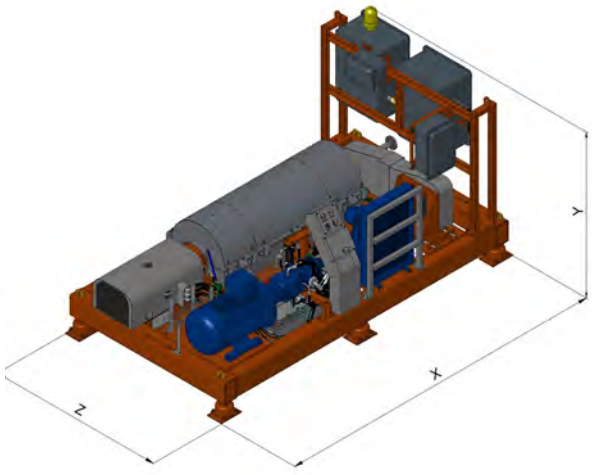
- Power: 400/460 v—50/60 hz, 3 phase
- Main drive motor: 120 hp [90 kw]
- Hydraulic pump: variable displacement pump

Certification

- CD-500 HV VFD: ATEX CE Ex II 2G C B IIB T3 or UL, class I, div I
- CD-500 HV FHD: ATEX CE Ex II 2G C B IIB T3
- CD-500 HV SL VFD: ATEX CE Ex II 2G C B IIB T3 or UL, class I, div I
- CD-500 HV SL FHD: ATEX CE Ex II 2G C B IIB T3



CD-500 HV VFD



CD-500 HV FHD

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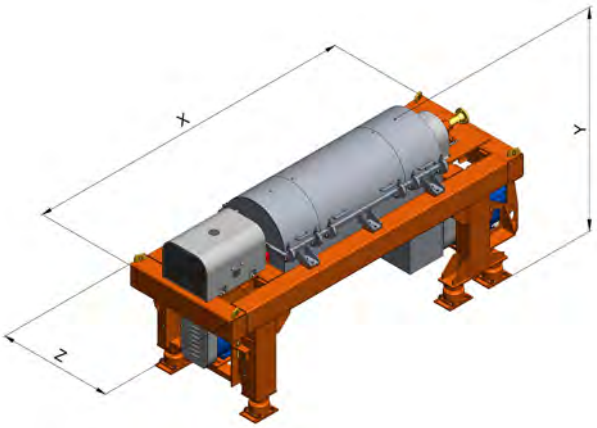
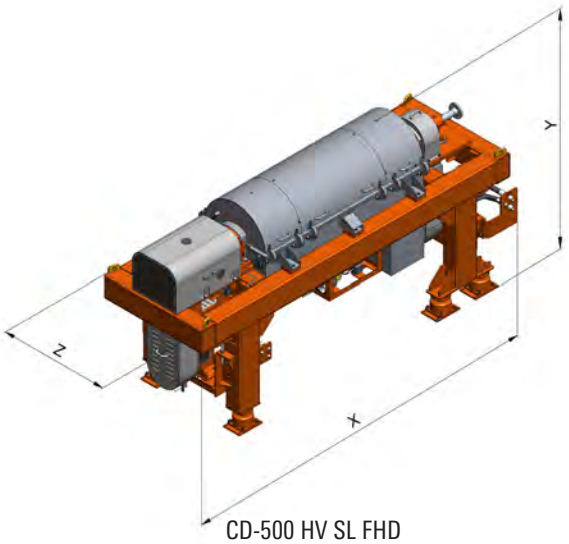
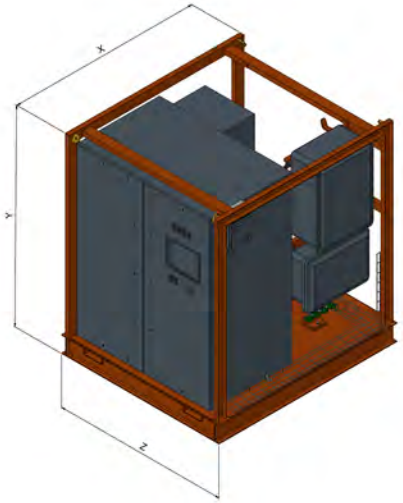
Dimensions and Weights				
	X	**Y**	**Z**	**Weight**
CD-500 HV Slim Line (SL) VFD	163.3 in [4,149 mm]	76.1 in [1,934 mm]	48.4 in [1,230 mm]	11,023 lbm [5,000 kg]
CD-500 HV SL FHD [centrifuge module]	157.9 in [4,010 mm]	76.3 in [1,937 mm]	47.6 in [1,210 mm]	10,417 lbm [4,725 kg]
CD-500 HV SL FHD [hydraulic module]	129.9 in [3,300 mm]	90.2 in [2,290 mm]	68.5 in [1,740 mm]	6,989 lbm [3,170 kg]
VFD control panel	84.6 in [2,150 mm]	90.7 in [2,305 mm]	4.8 in [1,900 mm]	4,564 lbm [2,070 kg]



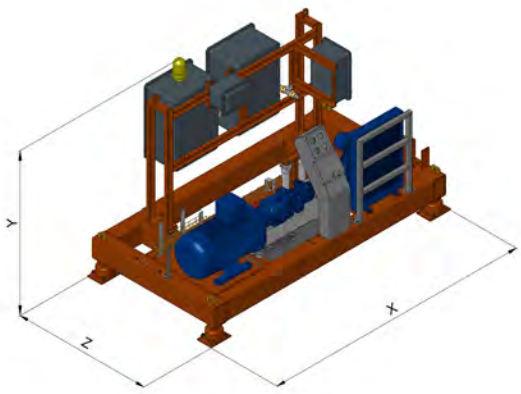
CD-500 HV SL VFD



CD-500 HV SL FHD
[centrifuge module]



VFD control panel



CD-500 HV SL FHD
[hydraulic module]

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Basic technical specifications all dimensions are expressed in inches [millimeters].

Performance

- Hydraulic capacity: 454 galUS/min [1,719 lpm]
- Operating speed: 3,000 rpm
- G-force: 2,334 g_n
- Sigma value: 43,583 ft² [4,049 m²]
- Solids discharge: 53 galUS/min [12.0 m³/h]

Rotating assembly

- Bowl diameter: 18.6 in [472 mm]
- Bowl length: 67.5 in [1,715 mm]
- Pond depth: 2.2, 2.6, 3.0 in [56, 66, 76 mm]
- Scroll type: single lead quasi-axial flow
- Scroll pitch: 5.12 in [130 mm]
- Main bearings: grease lubricated
- Internal bearings: grease lubricated
- Feed tube: open ended

Dimensions and Weights

	X	Y	Z	Weight
CD-500 XV SL VFD	49.5 in [3,797 mm]	70.4 in [1,788 mm]	49.2 in [1,250 mm]	9,802 lbm [4,446 kg]
VFD control panel (ATEX)	55.1 in [1,400 mm]	90.7 in [2,305 mm]	65.7 in [1,670 mm]	2,646 lbm [1,200 kg]

Rotating assembly material

- Bowl: stainless steel duplex A890
- Scroll: stainless steel duplex A890 AISI 304
- Scroll flights: tiles; tungsten carbide
- Discharge bushings: tungsten carbide

Gearbox

- Type: planetary (model; ZG 3700/10)
- Gear ratio: 80:1
- Torque, maximum: 6,269 ft-lbm [8,500 nm]
- Differential range: 1 to 40 rpm
- Weight: 474 lbm [215 kg]

Nozzle schedule

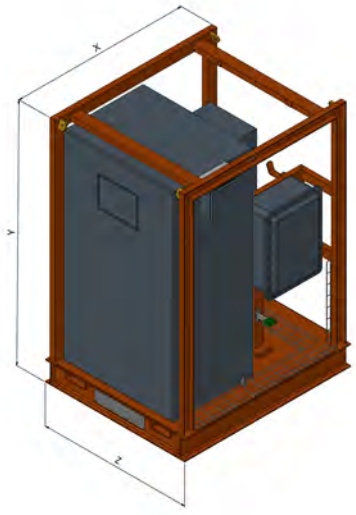
- Liquid discharge: 8 in victaulic
- Solids discharge: 31.9 × 17.7 in [810 × 450 mm]
- Feed tube: 2 in [ANSI B 16.5]

VFD type

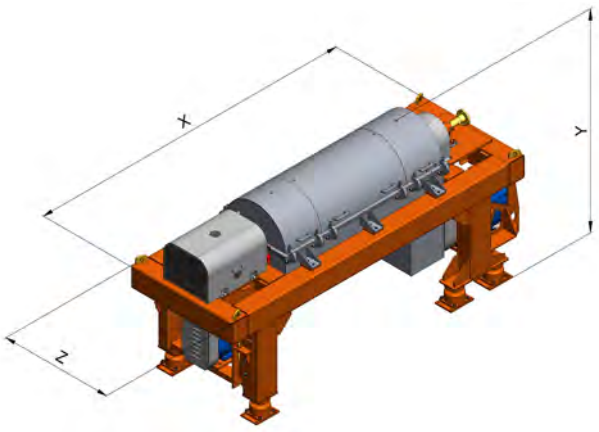
- Power: 400/460 v—50/60 hz, 3 phase
- Main drive motor: 60 hp [45 kw]
- Back drive motor: 20 hp [15 kw]

Certification

- CD-500 XV SL VFD: ATEX CE Ex II 2G C IIB T3 or UL, class I, div I



VFD control panel



CD-500 XV SL VFD

CD-500 XV

Centrifuge

The CD-500 XV Slim Line (SL) unit is designed for high-volume drill-solids removal within a relatively small footprint. The high bowl rotational speed generates high g-forces and excellent fluid separation. The result is drier cuttings and cleaner liquid discharge with lower oil-on-cuttings percentages and less probability of solids packoff than with conventional centrifuges.

A VFD (Variable Frequency Drive) module monitors and controls both the main and rear electric drives.

The operator can manage bowl and scroll speeds via a touch screen that also displays input from the various sensors, including temperature, current, rotational speed and vibration.

By recovering more fluid and producing drier cuttings with a smaller volume, the CD-500 XV centrifuge helps operators reduce their drilling waste and disposal volumes.

Features

Performance

- Quasi-axial scroll
- Smaller electric motors
- Slim line
- High bowl speed
- Variable bowl, scroll and pump speed
- User-friendly touch screen
- Split pillow blocks
- PLC control
- Stainless steel rotating assembly
- Perfectly balanced rotating assembly
- Tungsten carbide tiles (scroll)

Safety

- Vibration sensor
- Torque limiter
- Micro switches on vessel and guards
- Bearing temperature sensors

Benefits

Performance

- Quasi-axial scroll provides an increased flow area which minimizes the turbulence for an improved separation efficiency and a high fluid-handling capacity
- Reduced power requirements and overall weight (compared with CD-500 HV)
- Reduced footprint requirements
- High bowl speed assures a high g-force, solids removal efficiency percentage, finest cut points, and a high clarification capacity
- Complete control of g-force and differential settings for improved separation efficiency
- Split pillow blocks for increased protection against contamination, extended material life and easier maintenance
- Programmable logic controller (PLC) provides continues monitoring and automatic shutdown of all critical parameters while providing automatic control to avoid centrifuge plugging

◀ BACK

Basic technical specifications all dimensions are expressed in inches [millimeters].

Performance

- Hydraulic capacity: 454 galUS/min [1,719 lpm]
- Operating speed: 3,000 rpm
- G-force: 2,334 g_n
- Sigma value: 43,583 ft^2 [4,049 m^2]
- Solids discharge: 53 galUS/min [12.0 m^3/h]

Rotating assembly

- Bowl diameter: 18.6 in [472 mm]
- Bowl length: 67.5 in [1,715 mm]
- Pond depth: 2.2, 2.6, 3.0 in [56, 66, 76 mm]
- Scroll type: single lead quasi-axial flow
- Scroll pitch: 5.12 in [130 mm]
- Main bearings: grease lubricated
- Internal bearings: grease lubricated
- Feed tube: open ended

Rotating assembly material

- Bowl: stainless steel DUPLEX A890
- Scroll: stainless steel DUPLEX A890 AISI 304
- Scroll flights: tiles; tungsten carbide
- Discharge bushings: tungsten carbide

Gearbox

- Type: planetary (model; ZG 3700/10)
- Gear ratio: 80:1
- Torque, maximum: 6,269 ft-lbm [8,500 nm]
- Differential range: 1 to 40 rpm
- Weight: 474 lbm [215 kg]

Nozzle schedule

- Liquid discharge: 8 in victaulic
- Solids discharge: 31.9 × 17.7 in [810 × 450 mm]
- Feed tube: 2 in (ANSI B 16.5)

Vfd type

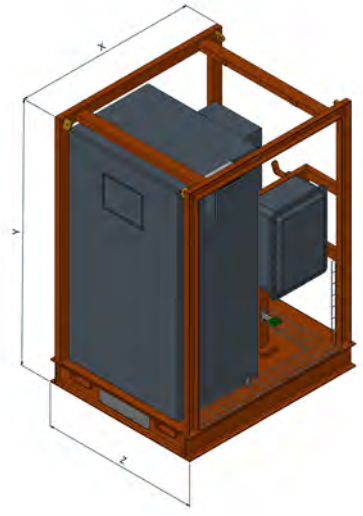
- Power: 400/460 v–50/60 hz, 3 phase
- Main drive motor: 60 hp [45 kw]
- Back drive motor: 20 hp [15 kw]

Certification

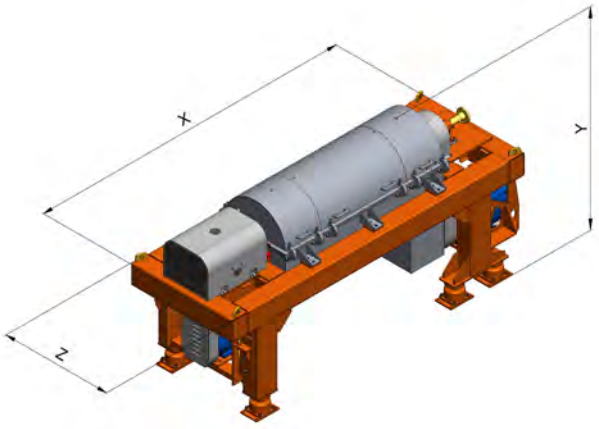
- CD-500 XV SL VFD: ATEX CE Ex II 2G C IIB T3 or UL, class I, div I

Dimensions and Weights

	X	Y	Z	Weight
CD-500 XV SL VFD	149.5 in [3,797 mm]	70.4 in [1,788 mm]	49.2 in [1,250 mm]	9,802 lbm [4,446 kg]
VFD control panel (ATEX)	55.1 in [1,400 mm]	90.7 in [2,305 mm]	65.7 in [1,670 mm]	2,646 lbm [1,200 kg]

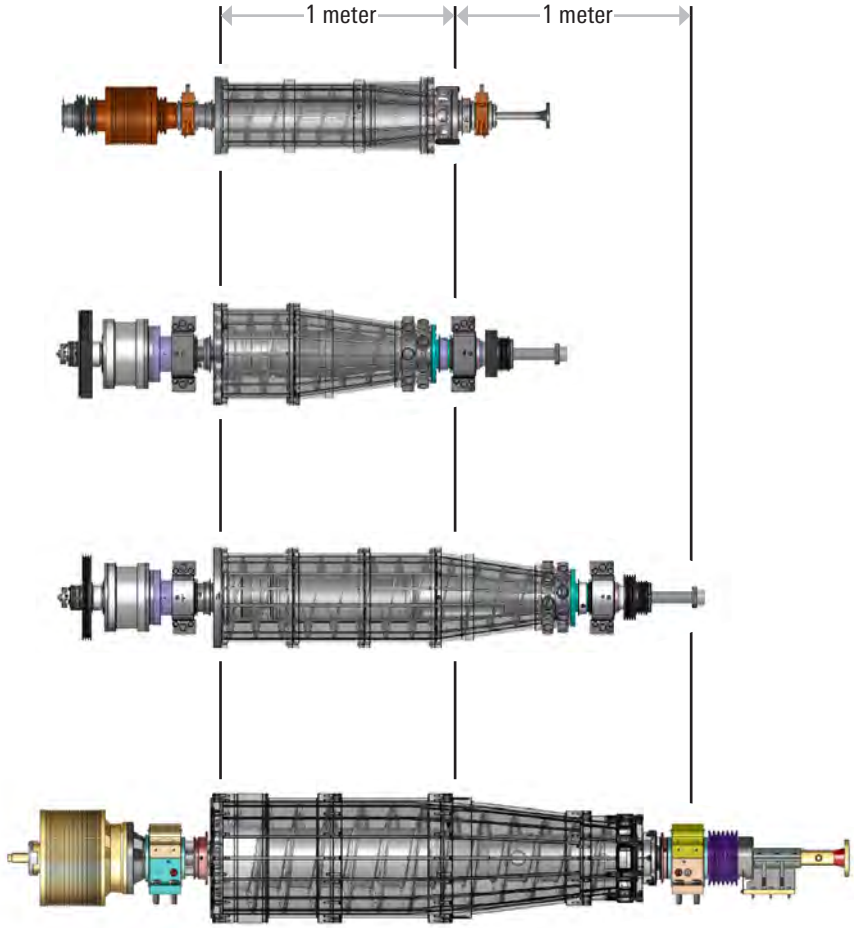


VFD control panel



CD-500 XV SL VFD

Centrifuge Rotating Assemblies



Bowl type: CD 250

- internal diameter: 253 mm [9.96 in]
- internal length: 941.5 mm [37.07 in]

Bowl type: 414

- internal diameter: 353 mm [13.9 in]
- internal length: 860 mm [33.86 in]

Bowl type: 518 HV

- internal diameter: 353 mm [13.90 in]
- internal length: 1,461 mm [57.51 in]

Bowl type: CD-500 HV

- internal diameter: 472 mm [18.58 in]
- internal length: 1,715 mm [65.52 in]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