



IPLOCA Environmental Award – 2022

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The fully electric HDD job site

Electric direct-driven equipment for an efficient HDD job site at low environmental impact

Description of the initiative

Vermeer

1. Vermeer business profile.

As a leading manufacturer of industrial and agricultural equipment, Vermeer relies on a team of nearly 4,000 and they're making a real impact. Around the world, Vermeer team members are rolling up their sleeves to design, build and support tough yellow iron built for customers doing the important work of connecting people to the necessities of life, managing natural resources and feeding and fueling their communities.

Headquartered in Pella, Iowa, U.S., Vermeer employs team members around the world, with regional offices in the Netherlands, Brazil and Singapore; additional manufacturing facilities in South Carolina, Florida and South Dakota in the United States, as well as in the Netherlands and in China; and the independent Vermeer dealer network consists of more than 600 dealers located around the world.

2. Findings

As a world leader in the horizontal directional drill (HDD) and fluid management industry, Vermeer identified a growing demand for electric-powered worksite solutions. Meeting this demand closely aligned to the company's innovation and product development focus to continually help customers overcome two of their most common challenges: how to optimize their workforce productivity, while limiting their worksite environmental impact.

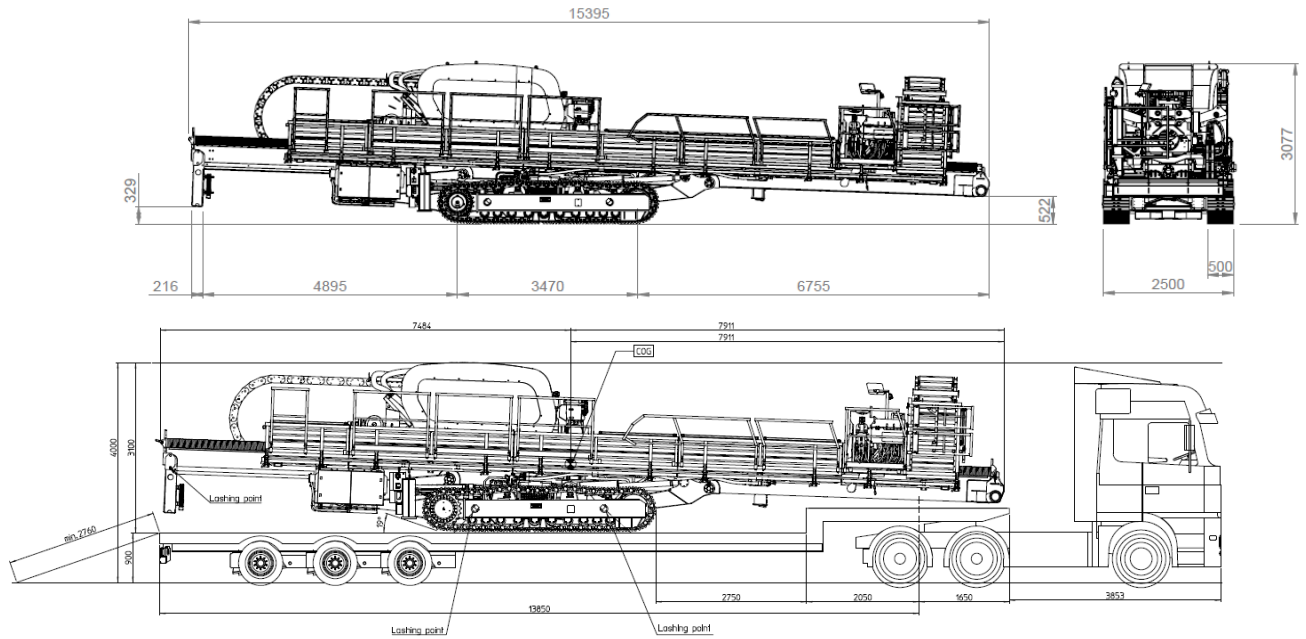
3. Solutions

The electric direct driven HDD and fluid systems technology offers a unique integrated electric powered system that optimizes efficiency across the drill rig and fluid management systems during operations. When connected to the electric grid or batteries, the system can operate as a fossil fuel-free system. The majority of the systems have been designed to match standard international shipping container dimensions to reduce the machine footprint, jobsite set-up time, complexity and cost.

VERMEER D120E – Electric direct driven horizontal directional drill

Specs	Value
Total weight* (transport)	35 t
Transport* length	15.4 m
Transport* width	2.5 m
Transport* height	3.1 m
Maximum thrust	100 t
Maximum pullback	120 t
Maximum torque	110 kNm @ 0 rpm – 60 kNm @ 30 rpm
Fluid course	4 in (101.6 mm)
Vise	<ul style="list-style-type: none">• Full traveling BOU• Carriage vise 0.7 m travel• Break out torque 220 kNm• Open top 10 in, 16 in opening
Wireline	Rear load tensioning wireline drum
Catwalk	Full length and easy rest in mast
Operator's cab	Off-board 10 ft.
Drill pipe	Range 2, 6-5/8" OD (5" to 7-5/8" capability)
Set-up	60 kVA onboard gen set for maneuvering

* Preliminary specifications, subject to change. Driller's cabin and generator specifications excluded.

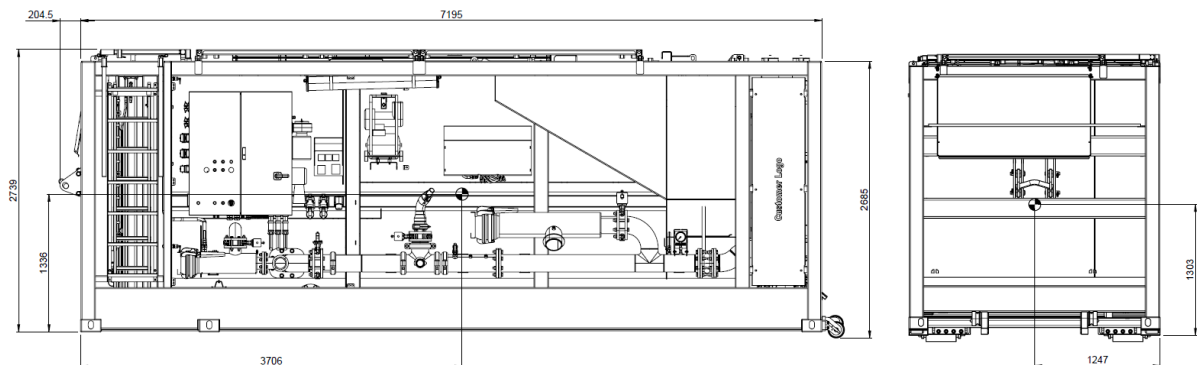


D120E transport dimensions*

Vermeer MR2000 – Electric combo mixing/reclaiming unit

Specs	Value
Dimensions in transport mode LxHxW	ISO container size 24 ft long (7195 x 2739 x 2494 mm)
Weight in transport mode*	17 t
Mixing and solids processing capacity	2000 L/min @20% SC (1.33 SG)
Mix tank volume	18 m ³
Reclaimer tanks volume	5,5 m ³
Screen preselected choices	coarse, medium, fine
Number of decks	2
Dual deck shaker, areas	scalping 3 panel polyurathene 0,81 m ² , primary/desanding 9 panel wedge wire 2,43 m ² , secondary/deslitting 3,6 m ²
Desander hydrocyclones set	2 x 10 in- 20deg
Desilter hydrocyclones set	12 x 4 in longbody
Processing pumps	
Desander pump	Mission - Magnachrome, 6x5x14 - 37kW – 11 in impeller
Desilter pump	Mission - Magnachrome, 6x5x14 - 37kW – 11 in impeller
Mix – Pre-pressure pump	Mission - Hi Iron, 6x5x14 - 37kW – 12 in TC impeller
Power supply:	200 kVA needed (with pit pump)

* Preliminary specifications, subject to change.

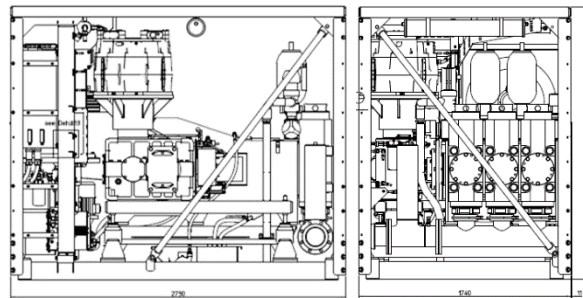


MR2000 transport mode dimensions*.

Vermeer SA2500 – Electric high pressure mud pump

Specs	Value
Dimensions in transport mode LxHxW	2730 x 2230 x 1740 mm
Weight in transport mode*	6,200 kg
Pump make	Tecniwell
Drive motor	Danfoss - Fully water cooled
Maximum flow rate with 7" liners	2200 L/min @ 80 bar with 7 in liners (210 SPM)
Recommended generator	375 kVA, 50 Hz

* Preliminary, subject to change.



SA2500 transport mode dimensions*.



Depiction shown



Depiction shown

With this technology already proven and tested in operations across Europe, Vermeer was able to fast-track an electric HDD offering that helps operators better control their cost efficiency and worksite impacts through reduced fuel use, low to near-zero emissions, limited noise and an overall smaller jobsite footprint.

The Vermeer E-HDD product range uses the electric direct drive of the D120E electric horizontal directional drill, SA2500 electric driven high-pressure pump and MR2000/MR1000 electric reclaimers to bring four environmentally focused advantages to HDD jobsites:

- **Reduced environmental footprint.** The drill itself produces zero emissions and the electric direct drive results in high efficiency of the entire system which, together with the inherent efficiency of the genset, can reduce total fuel consumption
- **Fewer chances for contamination.** The D120E electric drill is fully water-cooled (instead of oil-cooled) and the drill has a minimum amount of hydraulic fluid on board. On the SA2500 high-pressure pump and MR2000/MR1000 reclaimers, the electric motors directly drive the pumps to process and circulate the drilling fluids, so no hydraulic oil is used at all.

- **A quiet jobsite.** During operations, the equipment emits very low sound decibels, with the most sound actually coming from the rack and pinion gearboxes, pumps and suction system.
- **Maintenance:** The overall design of the drill, mixer/reclaimer and high-pressure pump minimize the need of maintenance which maximizes cost efficiency.

4. Implementation

In December 2020, Vermeer Corporation acquired the rights to develop, manufacture and distribute electric-powered HDD and fluid systems technology from the Dutch company Normag. After having publicly announced the acquisition, we have spent the first year and a half updating the design, implementing new safety features and creating all the necessary manuals (operator's, maintenance and parts) for the products, according to high-quality Vermeer standards.

All the teams at Vermeer, including general, product and sales management, engineering department, applications and service specialists, procurement and assembling line, were focused and striving for achieving the near-to-impossible goal of having a complete line-up of electric HDD equipment for pipeline installation ready to run within two years from the acquisition of Normag. Despite the supply chain shortage, the challenge of the pandemic and the specter of war in Ukraine, we undoubtedly succeeded.

The result is the current availability of a complete line-up of electric direct driven machines for HDD for the undergrounding of pipeline with low environmentally-impacting electric trenchless technology available for the industry today. All of this with the manufacturing standards of Vermeer, serialized production processes and after sales parts and service support in place.

5. Achievements

The implementation of the electric direct-drive technology on all the components of the HDD jobsite (drill, mixer/reclaimer and high pressure pump), leads to the minimization of the environmental footprint and emissions (pollutants, noise, etc.). Speed of operations and responsiveness of the drill, of the combo mixer/reclaimer and of the high-pressure pump together, with the automatization of almost all the operations of the drill, result in maximized productivity. The compactness of the systems minimizes transportation costs and logistic problems. And last but not the least, the high efficiency registered more than 10,000 hours of continuous functioning, which confirms the high reliability of Vermeer electric technology.

6. Long term planning

Vermeer plans to accelerate the electrification of a wide range of HDD equipment, offering integrated data solutions to better manage and monitor the whole machine fleets through the proven Telematics online platform by Vermeer. Thanks to the high level of digitalization already implemented on the rig, a possible further next step could be represented by autonomic features of the system, for further productivity optimization and further reduction of environmental footprint of pipeline installation by HDD.

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