



# **Inline Desander Standalone**

**Issued 15 Apr 10**

## **Maintenance & Operation Manual**

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## UNIT NUMBER IS KEY TO DERRICK SERVICE

All inquiries to Derrick must include the equipment unit number. The stainless steel unit number tag attached to each piece of Derrick equipment is your key to efficient service and support.



### Typical Derrick Unit Number

This unique number gives vital information to Service personnel who use it to identify the correct parts when filling orders, provide accurate responses to service questions, track documentation, and trace the equipment's history or configuration. In short, the **unit number provides the critical information needed to ensure that Derrick customers receive the best possible service.**

The unit number consists of a two-character alphabetic prefix that identifies the equipment type and a series of numeric characters that signify the sequence of the machine's manufacture. For example, unit number MA000001 would be the first screening machine manufactured by Derrick. Alphabetic prefixes currently in use are:

MA - Screening Machine	AD - Desilter and Desander
DG - Degasser	AG - Mud Agitator
CF - Centrifuge	SF - Screen Frame

To ensure that it will remain intact over many years of rigorous service, the heavy-gage tag is riveted to a structural member such as the shaker support structure. It is not to be confused with any other identifier on the machine such as a vibrator motor serial number.

For convenient availability, the unit number is also recorded in the Operation and Maintenance manual shipped with the equipment. When contacting Derrick for any equipment question or need, always have the unit number in your possession. It's the best way to get the most efficient service from our dedicated Service and Engineering personnel.





## **ABOUT THIS MANUAL**

**This document is published in both printed and electronic form. In the electronic manual, all sections and paragraphs listed in the CONTENTS are linked to the corresponding text.**

**Navigate the electronic manual as follows:**

- 1. To view any desired information, display the CONTENTS page and move the cursor to the desired paragraph or section title.**
- 2. To display the desired information, click on the listing when the pointing finger appears over the text.**
- 3. When finished viewing the text, press Alt + left arrow key to return to the CONTENTS page.**
- 4. If desired to return to the same information, press Alt + right arrow. To locate a different item, repeat steps 1 and 2.**

The content of this document is subject to change at any time. Information provided does not cover all details or variations possible with DERRICK equipment, nor does it cover every contingency that may be met in conjunction with installation, operation, maintenance, or troubleshooting of the equipment. Should additional information be required, or should situations arise that are not covered by this manual, bring the matter to the attention of your local DERRICK representative or the Service Department at DERRICK Corporation in Buffalo, New York.

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## 10" DESANDER - STANDALONE

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### DESCRIPTION

The 10" hydrocyclone desander is used to separate solids in the 40- to 100-micron range. It incorporates a precise combination of proportions, angles, ratios, and materials to optimize separation of solids from the feed material. The desander discharge may be fed to a desilter for finer particle separation or directly to the screening equipment. For optimum performance, the hydrocyclone requires a steady inlet feed pressure (feed head) and steady feed rate (GPM). The feed head may be produced by a gravity-feed system or a centrifugal pump. Each 10" hydrocyclone requires a nominal inlet flow rate of 500 GPM at 75 feet of head. To accommodate high flow rate requirements, up to three hydrocyclones can be grouped together with common feed and discharge manifolds (Figure 1).

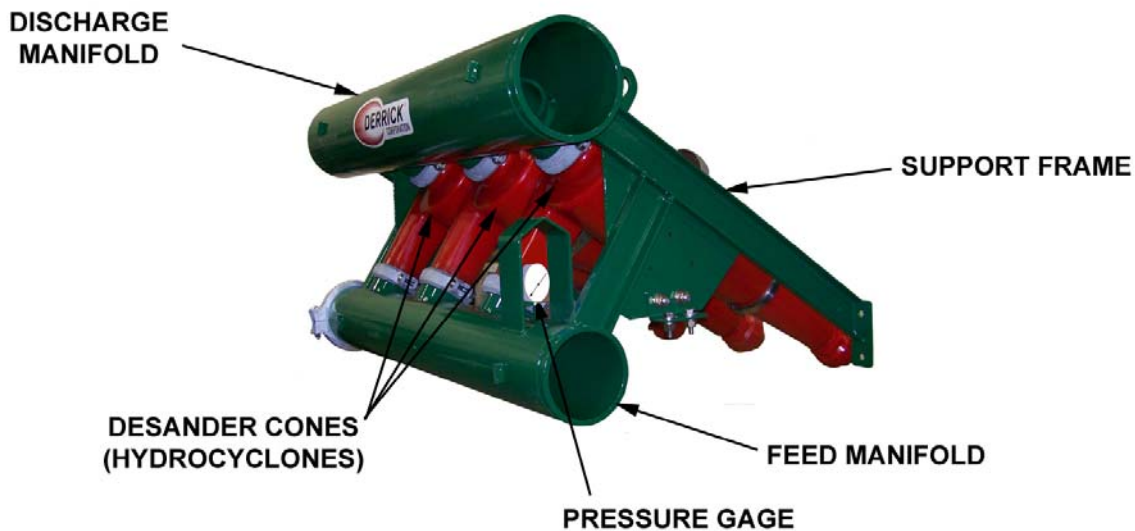


**Figure 1 Standalone 10" Desander**

The desander accepts up to three 10" polyurethane hydrocyclones (cones). The feed inlets of all cones are connected to a common feed manifold, and the overflow outlet of each cone is connected to a common discharge manifold (Figure 2). Feed slurry is introduced into the feed manifold and is equally distributed to the inlets of the cones. Extracted solids (underflow) are discharged from the lower end of the cones into a collection pan. Liquid discharge (overflow) exits the top of the cones and enters the discharge manifold. Underflow from the cones is routed to a vibratory screening machine or to a centrifuge for removing additional solids. Overflow from cones is routed to a desilter or similar equipment to remove smaller particles.

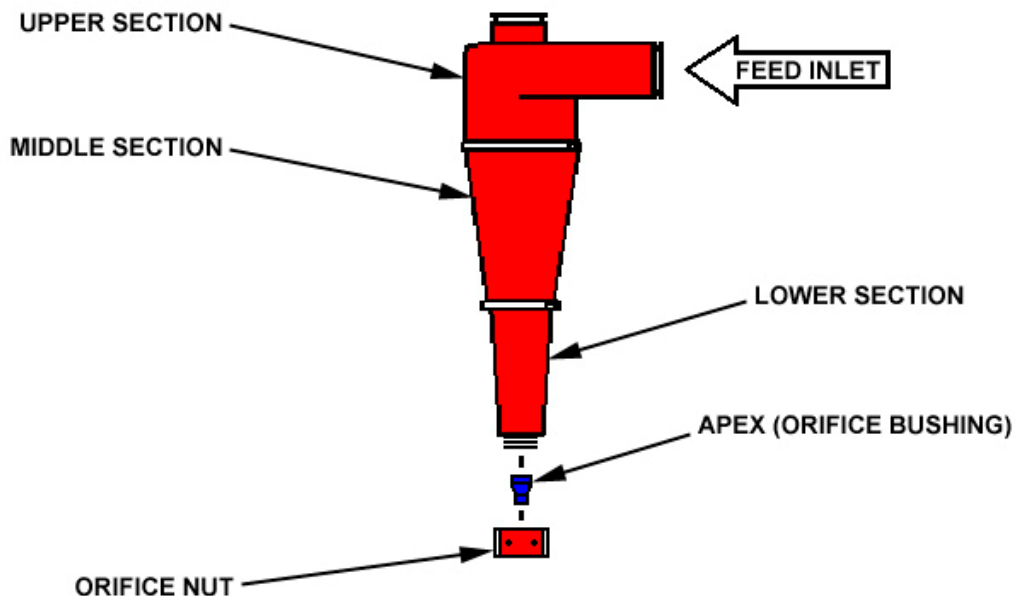
The Victaulic<sup>®</sup> cap supplied with the unit may be installed on either end of the feed manifold. This allows the feed slurry to be introduced from either the left or the right side of the unit. However, one end of the discharge manifold is permanently sealed allowing discharge only from the open end.

## 10" HYDROCYCLONE DESANDER



**Figure 2 Desander Major Components**

The hydrocyclone body consists of three main components: Upper, middle, and lower sections (Figure 3). The soft orifice bushing (apex) is positioned in the tapered hole inside the orifice nut, which is threaded onto the lower section. The diameter of the apex orifice controls the spray pattern produced during operation. The hydrocyclone spray pattern may be adjusted during operation by varying the opening of the apex. Turning the orifice nut clockwise compresses the apex, thereby reducing the orifice diameter. Turning the orifice nut counterclockwise releases compression, allowing the apex to return to its normal size.



**Figure 3 10" Hydrocyclone Components**

## THEORY OF OPERATION

Feed slurry is introduced into the feed manifold and is equally distributed to the inlets of the cones (Figure 4). Extracted solids (underflow) are discharged from the lower end of the cones into a collection pan. Liquid discharge (overflow) exits the top of the cones and enters the discharge manifold. Underflow from the cones is routed to a vibrating screen-type cleaning machine or to a centrifuge for removing additional solids. Overflow from cones is routed to a desilter or similar equipment to remove smaller particles.

Optimal performance of hydrocyclones requires a proper balance of feed head, feed rate (GPM), and apex opening. Improper balance of any of these variables can adversely affect performance. The following paragraphs describe normal and abnormal operation.

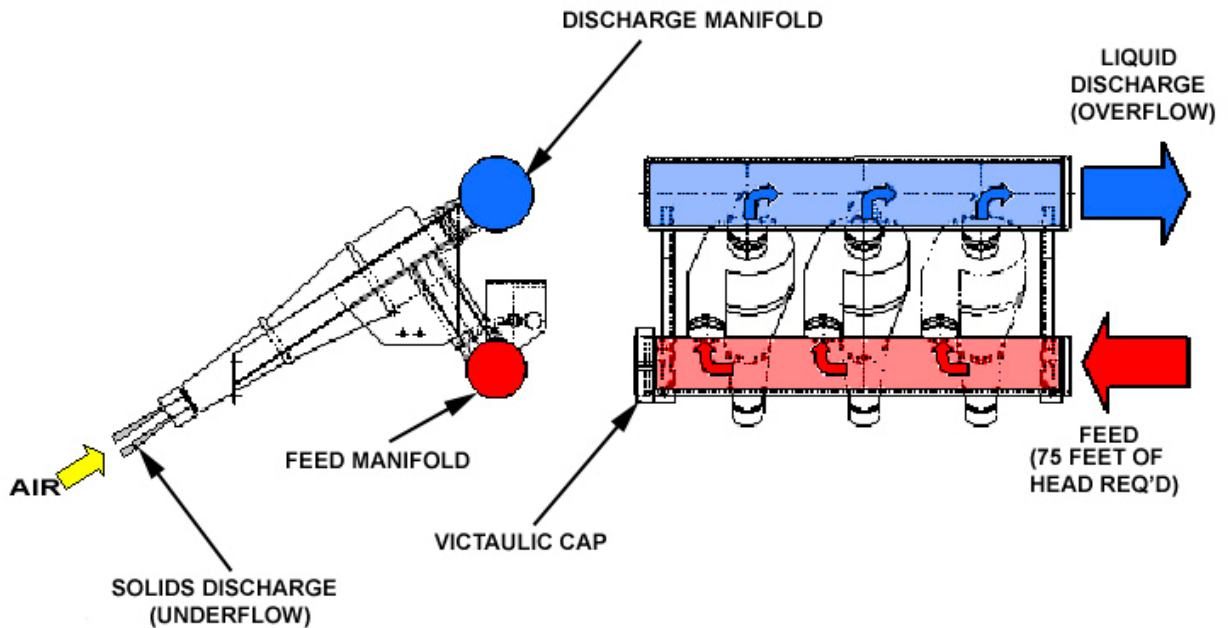


Figure 4 Desander Operation

## Normal Operation

In normal operation, feed slurry is introduced tangentially into the interior of the hydrocyclone (Figure 5) at high velocity causing a whirlpool effect to occur inside the cone. The swirling motion of the slurry drives the larger, denser particles outward against the cone wall while the smaller, lighter particles move toward the center of the cone.

The low-pressure vortex at the center of the cone pulls in the excess liquid and small particles, as well as drawing in air through the apex at the lower discharge end of the cone. The high-velocity air stream aids the upward flow of liquid and small particles toward the cone's upper discharge, while the spiraling stream of liquid and larger particles flows downward along the cone wall toward the lower discharge. Large solids leaving the lower discharge may be further processed for removal of remaining small particles and liquid, while the upper discharge from the hydrocyclone is often routed to desilters having 4-inch hydrocyclones for removal of finer particles.

## 10" HYDROCYCLONE DESANDER

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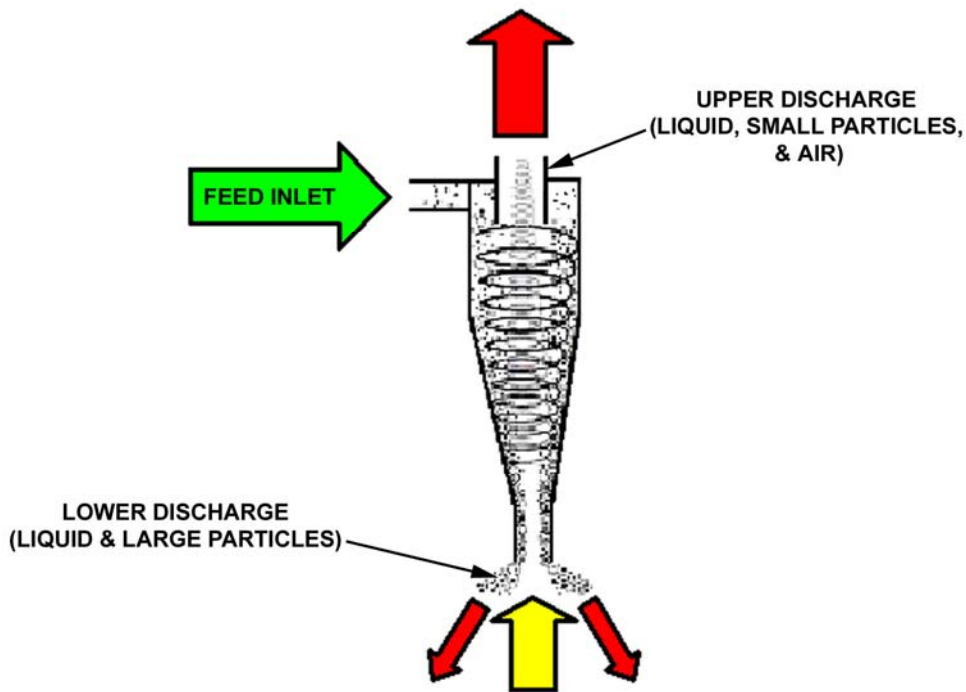


Figure 5 Normal Hydrocyclone Operation

### Abnormal Operation (“Roping”)

“Roping” is a term applied to a solid discharge stream (Figure 6) flowing from the hydrocyclone. This undesirable discharge pattern results from overloading the apex opening with solids, thereby preventing air from entering the cone. Due to the apex blockage, feed material entering the cone can no longer move downward and, therefore, flows directly out the upper discharge at the top of the cone. In this abnormal operating mode, flow from the upper discharge contains large particles that would normally flow out the lower discharge at the bottom of the cone. If permitted to continue for a lengthy period of time, the blockage becomes difficult to clear and the risk of internal damage to the cone increases.

“Roping” discharge results in reduced solids removal capability, increased probability of wear to hydrocyclone components, and potential damage to the feed pump.

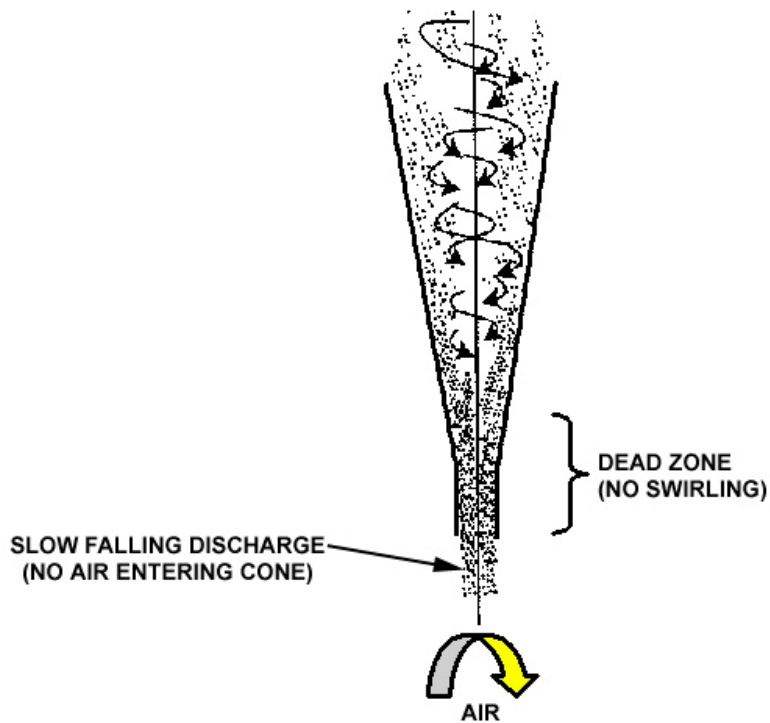


Figure 6 Abnormal Hydrocyclone Operation - “Roping” Discharge

## HYDROCYCLONE REMOVAL AND INSTALLATION

Dedicated shutoff valves are not provided for the 10” desander cones. Consequently, individual desander cones **CANNOT** be removed from the desander while the unit is operating. Desander cones are attached to the desander assembly with two 5-inch Victaulic® couplings (Figure 7). One coupling secures the feed inlet of the cone to the feed manifold, and the other clamp secures the overflow port of the cone to the discharge manifold.

	<p><b>WARNING! DISCONTINUE FLOW OF FEED SLURRY TO DESANDER, AND RELIEVE PRESSURE FROM FEED LINE BEFORE REMOVING OR INSTALLING DESANDER CONE(S). DO NOT ATTEMPT TO REMOVE OR INSTALL DESANDER CONE(S) WHILE MACHINE IS OPERATING.</b></p>
	<p><b>WARNING! DESANDER CONES WEIGH APROXIMATELY 100 LBS (45 KGS) EACH (NET WEIGHT). PROPERLY SUPPORT CONE BEFORE BEGINNING REMOVAL PROCEDURE.</b></p>

### Removal

1. Shut down feed to desander, and relieve pressure to feed manifold.
2. Support desander cone to be removed.
3. Using a suitable wrench, loosen and remove Victaulic® couplings that connect desander cone to feed and discharge manifolds.
4. Carefully lift and remove desander cone from desander.

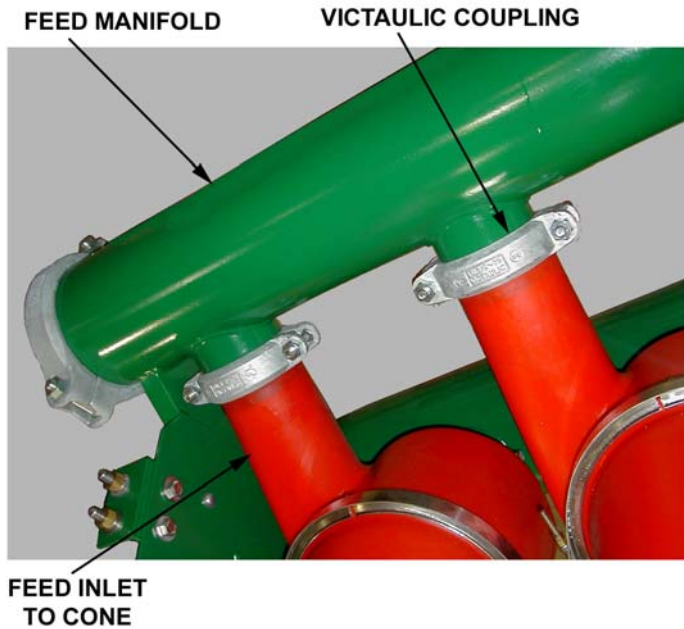
## 10" HYDROCYCLONE DESANDER

### HYDROCYCLONE REMOVAL AND INSTALLATION (CONT'D)

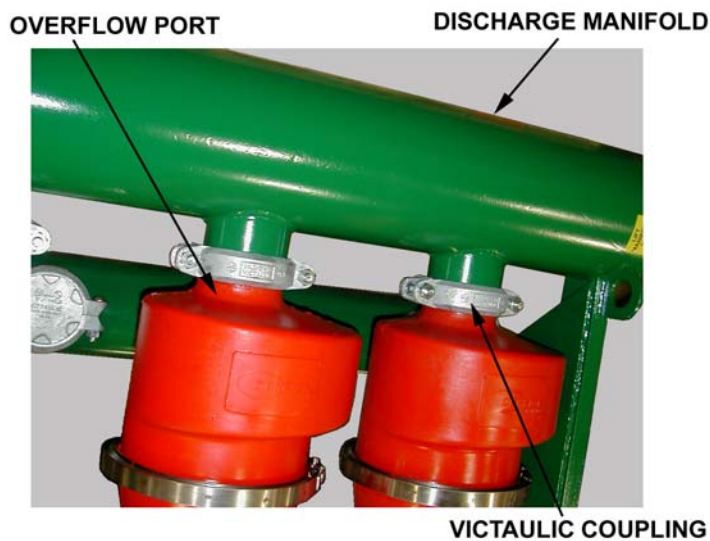
5. If desander will be returned to service before replacing the removed cone, cap the feed and discharge manifold ports for the removed cone using 5-inch Victaulic® caps (Derrick p/n VIC-5-60). Secure caps using Victaulic® couplings previously attaching cone to manifolds.



**Note! Be sure to cap feed and discharge ports if desander is to be returned to service before replacing cone removed in preceding steps.**



**Desander Cone Connection to Feed Manifold**



**Desander Cone Connection to Discharge Manifold**

**Figure 7 Desander Cone Connections**

## Installation

1. Shut down feed to desander, and relieve pressure to feed manifold.
2. If Victaulic® caps were installed, remove caps from ports on feed and discharge manifolds.
3. Install coupling gaskets on feed and discharge manifold ports.
4. Support desander cone, and align inlet and outlet ports of cone with corresponding ports on the feed and discharge manifolds.
5. Center coupling gasket between the coupling grooves in both the cone and manifold pipe. Place Victaulic® coupling halves on joint being sure that gasket remains centered on cone and manifold pipe grooves.

## HYDROCYCLONE ADJUSTMENT

Hydrocyclones must be properly adjusted to operate efficiently. Tightening the orifice nut (turning clockwise) compresses the apex and thereby reduces its orifice diameter. Loosening the orifice nut (turning counterclockwise) releases the compression, allowing the apex to return to its normal size. The following paragraphs describe the spray pattern adjustments to achieve optimal performance.

### Spray Patterns

The spray pattern varies in response to the feed head (inlet pressure), feed rate, and hydrocyclone apex opening. To maximize overall desander efficiency, the spray pattern of each cone must be balanced for optimal performance. This is done by observing the lower discharge pattern and then adjusting the apex opening to achieve the correct discharge angle (Figure 8) for the prevailing feed rate and inlet pressure.

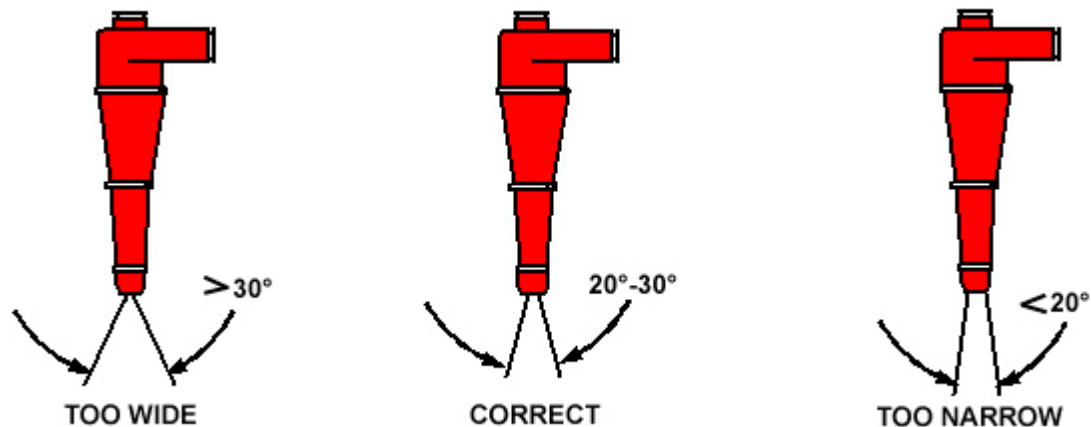


Figure 8 Spray Patterns - 10" Hydrocyclones

## 10" HYDROCYCLONE DESANDER

### Spray Pattern Versus Performance

The three spray patterns shown in Figure 8 are interpreted as follows:

**TOO WIDE** - Spray angle greater than 30° with a hollow center. In normal operation, this pattern is undesirable. This spray pattern indicates that the exit diameter of the apex is too large, and an excessive amount of liquid discharges along with the solids flowing from the bottom of the cone.

**Correct this condition by tightening orifice nut (turning clockwise) until desired spray profile is achieved.**

**CORRECT** - Spray angle in the range of 20° to 30° with a hollow center. In normal operation, this pattern is desirable.

**No adjustment required.**

**TOO NARROW** - Spray angle less than 20° with a hollow center. In normal operation, this pattern is undesirable. This spray pattern indicates exit diameter of the apex is too small, the solids discharge is too dry, and excessive solids are being discharged with the liquid from the upper discharge.

**Correct this condition by loosening orifice nut (turning counterclockwise) until desired spray profile is achieved.**

### RECOMMENDED OPERATING PRESSURES

Recommended operating pressures for the 10" hydrocyclone desander with 75' head inlet pressure are listed in the following table:

Mud Weight (PPG)	Specific Gravity	Operating Pressure (PSI)
8.33	1.00	32
9.00	1.08	35
10.00	1.20	39
11.00	1.32	43
12.00	1.44	47
13.00	1.56	51
14.00	1.68	54
15.00	1.80	58
16.00	1.92	62
17.00	2.04	66

Where:

PPG = Pounds per gallon

$$\text{Specific Gravity} = \left( \frac{\text{Mud Weight}}{8.33} \right)$$

1 PSI = 2.309 Feet of Head

$$\text{Operating Pressure} = \left( \frac{\text{Feet of Head}}{2.309} \right) \left( \frac{\text{Mud Weight}}{8.33} \right)$$

**NOMINAL FLOW RATES**

The following nominal flow rates are based on 500 GPM per hydrocyclone at a 75' head inlet pressure. Actual flow rates may vary, depending on mud weight, particle sizes, and cone adjustment.

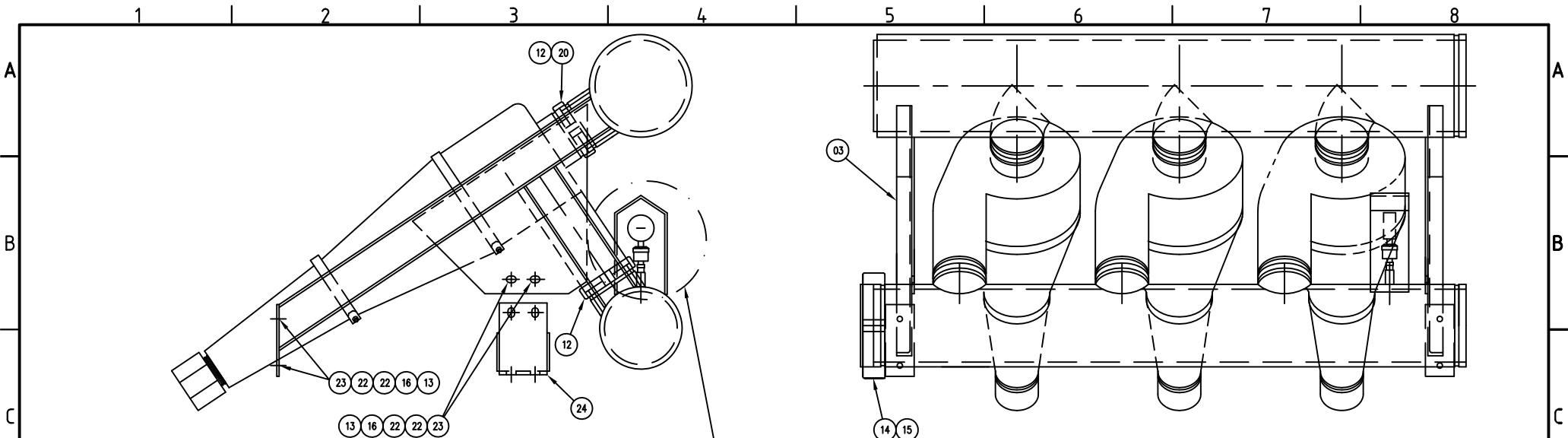
<b>Number of Hydrocyclones</b>	<b>3</b>	<b>2</b>	<b>1</b>
Nominal Flow Rate (GPM)	1500	1000	500

**REPLACEMENT PARTS**

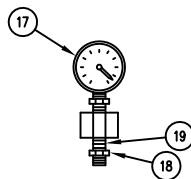
Replacement parts for the 10" hydrocyclone desander are shown and listed on the following engineering drawings:

<b>Number</b>	<b>Title</b>
12945-00-007	Desander, Front Mount
6066-51	10" Desander Cone

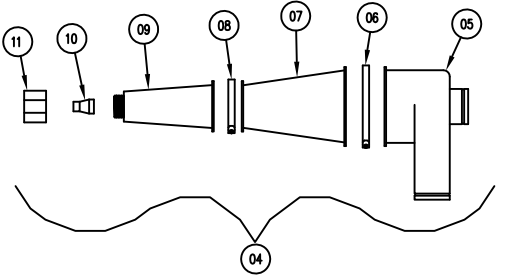




SEE GAUGE ASSY DETAIL



GAUGE ASSEMBLY  
NTS



REQD	ITEM	PART NAME	PART NUMBER
	2	2	24 MOUNTING BRACKET 14705-01
1		23	HEX HEAD CAP SCREW 5/8-11 X 1 3/4 SS HXCS-63-11X175
2		22	5/8 FLAT WASHER SS 12013-01
	8	8	21 BOLT ASSEMBLY
		2	20 5" VICTAULIC CAP VIC-5-60
	1	1	19 1/4 CLOSE NIPPLE NPLE-25-S4
	1	1	18 REDUCER 3/8 TO 1/4 IMP-24SB-06X04
	1	1	17 0-100 PSI GAUGE PP1429
1		16	5/8 LOCK WASHER SS WLSS-63
	1	1	15 8" VICTAULIC CAP VIC-8-60
	1	1	14 8" VICTAULIC COUPLING # 75 VIC-8-75
1		13	HEX NUT 5/8-11 BRS NHHB-63-11
	6	6	12 5" VICTAULIC COUPLING # 75 VIC-5-75
1		11	APEX HOLDER 6066-58
1		10	APEX 1.250 6066-57
1		09	LOWER SECTION 6066-56
1		08	LOWER BAND 6066-55
1		07	MIDDLE SECTION 6066-54
1		06	UPPER BAND 6066-53
1		05	UPPER SECTION 6066-52
	3	2	04 10" DESANDER CONE 6066-51
	1	1	03 DESANDER STRUCTURE 10243-00-004
		02	THREE CONE DESANDER ASSEMBLY
		01	TWO CONE DESANDER ASSEMBLY

GA: 14496-00

EB	DEPT.
A	1bc, 4c

3	ITEM 22 - 12013-01 WAS WFSS-63, ITEM 13 - 5/8-11 BRS / NHHB-63-11 WAS 5/8-11 SS / NHHB-63-11, EB: WAS 1ABC, DELETED 2BCDC, PUT ON NEW FORMAT	JHM	BA	4/27/09
2	10243-00-004 WAS 10243-15-004	WS		1/26/01
1	ADDED ITEM 24 (MOUNTING BRACKET)	WS		8/18/00

TITLE PARTS LIST FOR FRONT MOUNT DESANDER (2 OR 3) 10" CONES				
DOWN	CR	CKD	MP	DATE 7/8/96
SCALE	1:10		REV	3

REV CHANGE CKD DATE  
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SHEET SIZE	B	Y	DMN	WS	1/19/00
DRAWING NO.	F	C	CKD		

12945-00-006



LO,SH,PC,UR, MAN



1 2 3 4 5 6 7 8

A

B

C

D

E

F

A

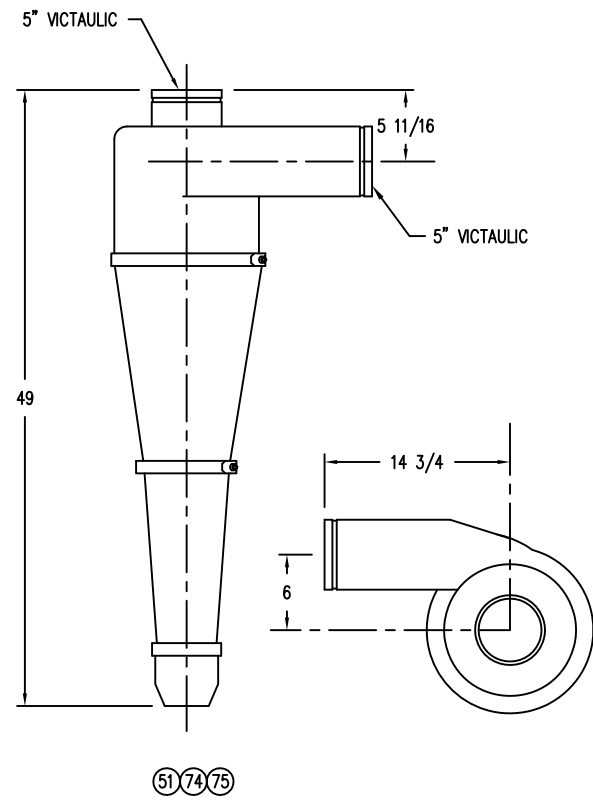
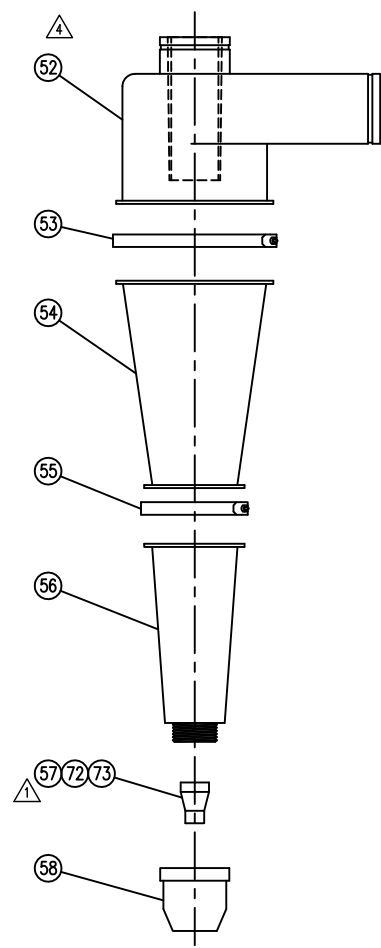
B

C

D

E

F



\* = OPTIONAL

REV	QTY	ITEM	PART NO./ DESCRIPTION
△2			76
*			75 ASSEMBLY W/ 1.500 APEX
*			74 ASSEMBLY W/ 1.000 APEX
△1*	1		73 ORIFICE BUSHING W/ 1.500 APEX
*		1	72 ORIFICE BUSHING W/ 1.000 APEX
	1	1	58 ORIFICE NUT
△3		1	57 ORIFICE BUSHING W/ 1.250 APEX
	1	1	56 LOWER SECTION
	1	1	55 LOWER BAND
	1	1	54 MIDDLE SECTION
	1	1	53 UPPER BAND
△4	1	1	52 UPPER SECTION W/VORTEX FINDER SLEEVE
△3			51 ASSEMBLY W/ 1.250 APEX
			QUANTITY ITEM PART NO./ DESCRIPTION

(REF- 6606-00)

3	ITEMS 51 AND 57 WERE BOTH LISTED AS 1.375 APEX (SUPPLIER TYPO)	TJS	NVB	2/28/08	TITLE 10" DESANDER CONE						
2	ADDED ITEM 76		BA	11/09/01							
1	ADDED OPTIONAL ASSEMBLIES 74 & 75 W/ ITEMS 72 & 73	GAK	PR	10/3/96	DOWN	GAK	CKD	PR	DATE 3/16/95	SCALE 1:10	REV 4
REV	CHANGE	CKD	DATE								
<p>THE DESIGNS AND INFORMATION CONTAINED ON THIS DRAWING OR COPIES REMAIN THE EXCLUSIVE PROPERTY OF DERRICK CORPORATION BUFFALO, NEW YORK U.S.A. AND ARE NOT TO BE REPRODUCED WITHOUT THE WRITTEN PERMISSION OF DERRICK CORPORATION. THE INFORMATION CONTAINED ON THIS DRAWING SHALL ONLY BE USED BY CUSTOMERS OR PROSPECTS OR THEIR AGENCIES IN THE ARRANGEMENT OR INSTALLATION OF DERRICK EQUIPMENT, OR BY VENDORS IN QUOTING ON OR IN THE SUPPLY OF PARTS OR ASSEMBLIES TO DERRICK, OR BY OTHERS FOR THE SPECIFIC REASON OUTLINED IN THE TRANSMITTAL WHETHER WRITTEN OR VERBAL.</p>											
<p>REMOVED ITEM 76 VORTEX FINDER SLEEVE, QTY WAS 1; ADDED VORTEX FINDER SLEEVE TO DESC IN ITEM 52</p>						<p>BKS EJR 3/3/08</p>		<p>DRAWING NO. 6066-51</p>		<p>DERRICK CORPORATION 590 DUKE ROAD BUFFALO, NY 14225 U.S.A.</p>	

EB DEPT.  
A 4A

4 REMOVED ITEM 76 VORTEX FINDER SLEEVE, QTY WAS 1; ADDED VORTEX FINDER SLEEVE TO DESC IN ITEM 52 BKS EJR 3/3/08

B Y DMN  
SHEET SIZE F C CKD  
DRAWING NO. 6066-51

**DERRICK**  
CORPORATION  
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

1 2 3 4 5 6 7 8





## CERTIFICATE OF ORIGIN

Equipment:	Desilters and/or Desanders
Model:	Round Desilter, Inline Stand-Alone Desilter, Inline Stand-Alone Desander
Characteristics:	N/A

Derrick Corporation acknowledges that the above set-forth product is manufactured in the United States of America as of the date of this certificate. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

A handwritten signature in blue ink that reads "Jennifer J. Polanowski".

Date: 28-December-2011

Signature: Jennifer J. Polanowski  
Derrick Corporation



## CERTIFICATE OF QUALITY

Equipment:	Desilters and/or Desanders
Model:	Round Desilter, Inline Stand-Alone Desilter, Inline Stand Alone Desander
Characteristics:	N/A

Derrick Corporation acknowledges that the above set-forth product conformed to the requirements for the applicable purchase order at the time of its original shipment by Derrick Corporation in that all construction materials and components were new and unused, were manufactured for this product, and that it was free of any known defects as to their design, material and workmanship. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

A handwritten signature in blue ink that reads "Jennifer J. Polanowski".

Date: 29-December-2011

Signature: Jennifer J. Polanowski  
Derrick Corporation



## SHIPPING FINAL INSPECTION AND RUN TEST CERTIFICATE

Equipment:	Desilters and/or Desanders
Model:	Round Desilter, Inline Stand-Alone Desilter, Inline Stand-Alone Desander
Characteristics:	N/A

The product listed above was inspected and found to be in conformance with Derrick Corporation's internal coating, run test, and assembly inspection documents that were required for the type of equipment manufactured in accordance with the Derrick quality system. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

A handwritten signature in blue ink that reads "Jennifer J. Polanowski".

Date: 29-December-2011

Signature: Jennifer J. Polanowski  
Derrick Corporation



### CERTIFICATE OF CONFORMANCE

Equipment:	Desilters and/or Desanders
Name and Address of Manufacturer:	Derrick Corporation 590 Duke Road Buffalo, NY 14225
Model/Type Ref:	Round Desilter, Inline Stand-Alone Desilter, Inline Stand-Alone Desander
Rating and Principle Characteristics:	N/A
Additional Information:	None

Derrick Corporation certifies that the above-listed product for the referenced order conformed to the requirements of the specified order at the time of its original shipment by Derrick Corporation in that: all construction materials and components were new and unused, manufactured for this equipment, and that the goods were free of any known defects as to their design, material and workmanship. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

Date: 20-February-2012



Signature:

for  
Thomas Silvestrini