LAKOS	**INSTALLATION, OPERATION MAINTENANCE**	

HTX/HTH SERIES SEPARATORS

INSTALLATION, OPERATION, AND MAINTENACE MANUAL

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Principle of Operation

LAKOS Separators are designed specifically to remove solids from liquids. Each model is calculated for use within a prescribed flow range for maximum performance and solids removal. Flow rates above and below the recommended range may affect such performance.

Upon tangential entry, the liquid/solids are drawn through internal tangential slots and accelerated into the separation chamber where solids heavier than the carrying liquid are centrifugally separated and allowed to accumulate in the unit's collection chamber for eventual purging (see Page 5). The liquid (free of separable solids) is then drawn to the vortex and up through the separator's outlet.

Installation Instructions

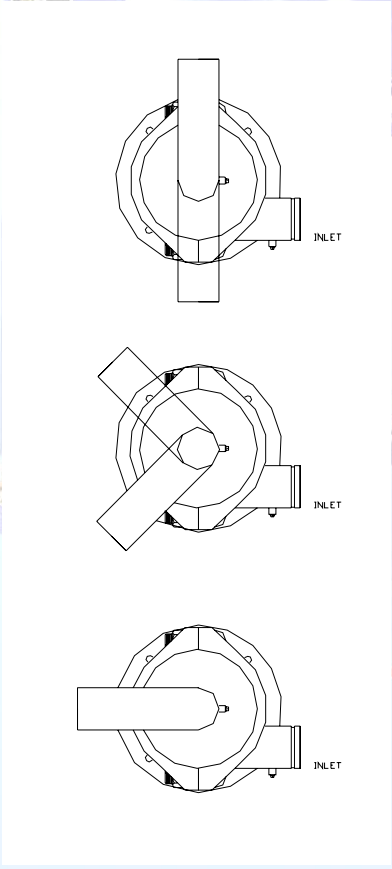
1. **LAKOS Separators are shipped on skids or in wooden crates. Support legs (22 ½° low profiles only) are detached. Lifting Lugs, located on the unit's side and/or flanges, are provided for hoisting as necessary.**
2. A suitable foundation is necessary to accommodate the LAKOS Separator's weight *including liquid.* Anchor bolts are recommended in the base of the legs (low profile) or skirt (vertical profile).
3. Prior to installation, inspect the inlet/outlet/purge connections for foreign objects incurred during shipping/storage.
4. Inlet/outlet pipe connections to the LAKOS Separator should be a straight run of at least five pipe diameters to minimize turbulence and enhance performance.
5. Proper purge hardware and/or solids-handling equipment is required to flush separated solids from the separator.
6. All LAKOS Separators operate within a prescribed flow range **(Pipe size is not a factor in model selection).** Use appropriate hardware to match the inlet/outlet size.

Grooved couplings are not included with the separator. Optional flanged connections are available upon request.

7. Inlet pressure to the LAKOS Separator must be at least equal to or greater than the anticipated pressure loss through the separator plus 15 psi (1 bar) plus whatever downstream pressure is required.
8. Pressure gauges are required at both the inlet and outlet of the separator in order to monitor pressure loss and proper flow. If separator operates with an open discharge, a valve should be installed to create a back pressure of at least 5 psi (0.3 bar).
9. Winterizing is important if the LAKOS Separator is to remain idle in freezing temperatures. Drain liquid as necessary to avoid expansion of water to ice and related damage.

Recommended Inlet & Outlet Piping

The inlet and outlet piping of a separator are important to controlling vibration of the unit. The vibration is more prevalent in units larger than 6", however, Lakos recommends the illustration configuration bellow be followed on all units unless absolutely necessary. Factory should be consulted on units larger than 6" if configurations cannot be followed.



Maintenance/Purging

1. ***LAKOS Separators must be purged regularly.*** Otherwise, the accumulation of separated solids will overfill the separator's collection chamber, substantially affecting performance and causing undo wear.
2. Several purging options are available and all may be performed while the LAKOS Separator is in full operation.
   a. **Manual:** A full-port, straight-through valve may be installed on the standard purge opening and actuated manually as necessary to purge separated solids.
   b. **Automatic:** The use of LAKOS Separators in a given application typically implies the need for heavy or unusual solids removal. ***A LAKOS Auto-Purge System*** is therefore recommended. Consult your LAKOS representative for details on motorized ball valves and other systems.
   c. **Semi-Automatic:** The use of LAKOS Separators in a given application typically implies the need for heavy or unusual solids removal. ***A LAKOS Solids Recovery Vessel System*** is therefore recommended. The SRV-816 allows for continuous purging of the solids collected into a separate collection bag. Once the bag is full with solids, the bag is emptied. The bag can be cleaned and reused, or simply replaced. Consult your LAKOS representative for details on the solids recovery vessel and accessories.
3. HTX/HTH Separators feature standard purge outlets. Prior to start-up, the installation of a manual valve on the purge is recommended so that this outlet may be serviceable at any time for either supplemental purging or as a stand-by, should the primary purge line ever require servicing.
4. ***Important:*** All purge hardware should be installed prior to any elbows or turns in the purge piping. Avoid "uphill" purging, which can clog piping and hinder effective solids evacuation.
5. To determine the necessary frequency, purge often at first and calculate the proper rate with regard to the actual volume of separated solids. Purge duration should be long enough to evacuate the purge chamber of solids. Frequency of purge should not exceed the time it takes to over fill the collection chamber. Consult your LAKOS representative for specific recommendations regarding your application.
6. When operating in sub-freezing temperatures, be sure to protect the separator's collection chamber and all purge line piping from freezing.

Maintenance Recommendations

LAKOS recommends periodic inspections of the separator to keep performance at an optimum level.

Full Faced Flange Gasket or Victaulic Gaskets should be checked for leaks and replaced as necessary. Gasket should be replaced at disassembly of separator.

Main Barrel Seal should be replaced when disassembly of separator is required.

Hand Hole Clean-out. Hand Hole should be removed to inspect the collection chamber for unwanted build up. Inspection should be conducted monthly or when shutdown is convenient for access.

Hand Hole Gasket, inspected for leaks and change as necessary.

Separator Slots should be inspected during facility pipe inspection is required. Inspection of slots is recommended when separator performance is suspect. Slots should be checked for obstruction and wear.

Note:
Visual inspection of the separator should be conducted once a month. Visual inspection should also include observing the inlet and outlet gauges on the separator. This inspection will indicate the pressure drop across the separator. The pressure drop and actual flow rate can be compared to the product brochure to determine if the separator is operating within its expected performance range. Automatic purge or manual purge should be checked for leaks and operation. Purge valve seats or diaphragms should be changed as necessary.

TROUBLE-SHOOTING GUIDELINES FOR SEPARATOR INSTALLATIONS

1. Verify Actual Flow Rate:

Use pressure gauges to indicate differential pressure and flow meter to verify flow rate. (Multiple pumps used to increase flow are installed in parallel (into common manifold); multiple pumps to increase pressure are installed in series (one after another).

Flow meters should be installed prior to the separator. Flow meters installed after the separator will indicate erroneous data.

2. Plumbing Two Separators:

Do not plumb two separators from two independent pumps into the same outlet header without installing balancing valves on the discharge of each separator. The balancing valves must be set to achieve a pressure loss across each separator that indicates a flow rate (according to that model's published flow chart) equal to the flow rate anticipated through the pump that feeds each separator.

3. Verify Actual Inlet Pressure:

Actual inlet pressure must be at least 15 psi (1.03 Bar). A minimum backpressure of 5 psi (.34 Bar) must be created at the separator discharge. This may be accomplished via process equipment, piping, or a valve. Unrestricted open discharge to a pit, sump, etc.,will result in unacceptable performance.

Be sure that no source of vacuum/suction exists in the piping arrangement. If vacuum/suction exist (i.e. downward piping after the separator, pump suction installation, booster pump etc.), put a valve between the separator and the suction source and pressure gauges on either side of the valve. Throttle the flow until the pressure loss across the separator indicates the published flow rate which most closely resembles the anticipated flow rate through the separator.

4. Vibration:

Check installation piping inlet & outlet configurations (see appropriate product sheets for model of separator installed). Mild vibration is possible in some installations and should be considered normal. Excessive vibration is typically due to entrained air (use air vents), improper piping (follow the installation instructions) or system vibration (amplified at the separator).

Units should be secured properly to the floor or wall. If separator is hung, stabilizers may need to be added. The foundation must be sturdy enough to support the weight of the product (expected wet weight can be obtained from the product literature).

The use of expansion joints is advisable with all separator installations. It is particularly recommended that these devices be employed when piping arrangements cannot comply with the configurations suggested by LAKOS product literature.

5. Vertical Units:

Be aware that solids may accumulate within the separator for a period of time until the solids reach the level of the purge outlet. The purge outlet is not flush with the bottom of the solids collection chamber.

6. Purging:

Avoid uphill piping. Purge-piping size is recommended by factory. Be sure that purging is maintained for the proper duration (proper duration is the time it takes fluid to come out "clean") in order to pass all accumulated solids through the full length of the purge piping.

Continuous purge (bleed) piping must be sized properly. Oversized piping will allow purged solids to settle in the line and result in plugging. Under sized piping will unduly restrict the flow and will result in plugging. **Purge flow must not exceed 10% of the inlet flow.** If this occurs, separator efficiencies will be severely reduced.

If the accumulation of solids in the separator's collection chamber becomes clogged or compacted, it may be necessary to shutdown or bypass the separator and gain internal access to clear the debris.

Never purge the separator into the fluid source from which the separator is being fed unless the actual solids are being contained by an appropriate solids collection technique.

Do not connect two or more separators to one Closed Recovery System unless the separators are supplied by the same pump and the separators are of the same model and size.

7. Super-Separators:

Two-stage separators (i.e. Super Separator) must be purged separately…do not join purges together.

8. Installation:

Proper installation should always include an isolation valve between the separator purge outlet and any purge system. This will allow for the easy removal of the purge system for servicing without having to shut down the entire system.

Separators which feature a removable upper chamber should be installed with a spool in order to facilitate the removal of the upper chamber (see diagram on the appropriate product sheet).

9. Flanges/Couplings:

All flanges and/or grooved couplings should have the appropriate gasket/seal in order to ensure a leak-free installation. All hand-hole clean-out ports and other internal access devices should also be properly re-sealed after use.

10. Air Relief Ports:

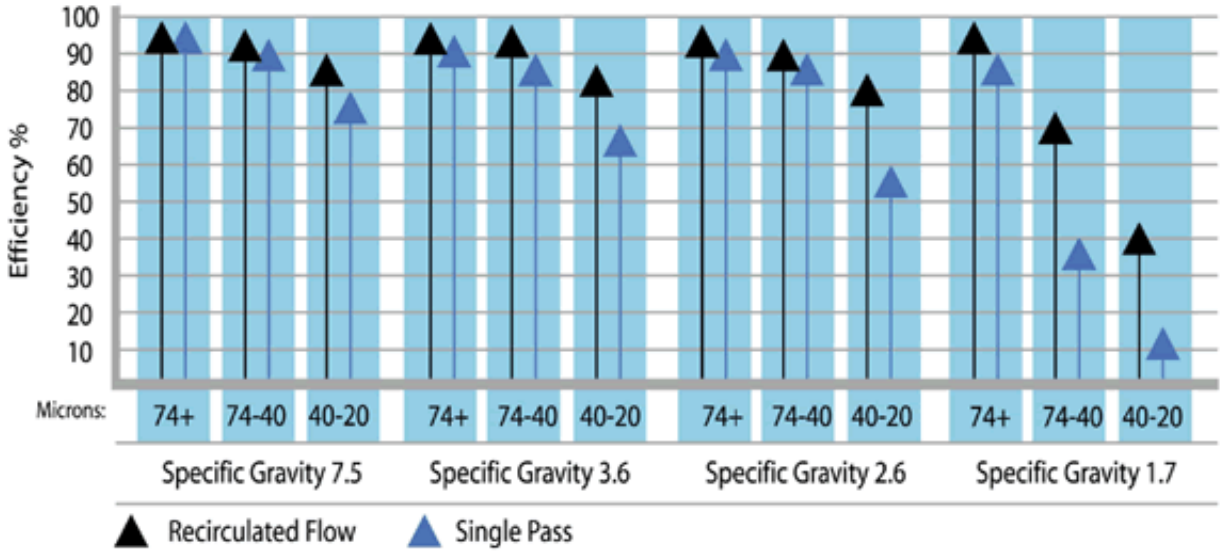
The appropriate air relief ports should be used at start-up to expel air from the separator.

If the separator will be drained periodically or exposed to entrained air or gases from the piping system, air vents should be permanently installed.

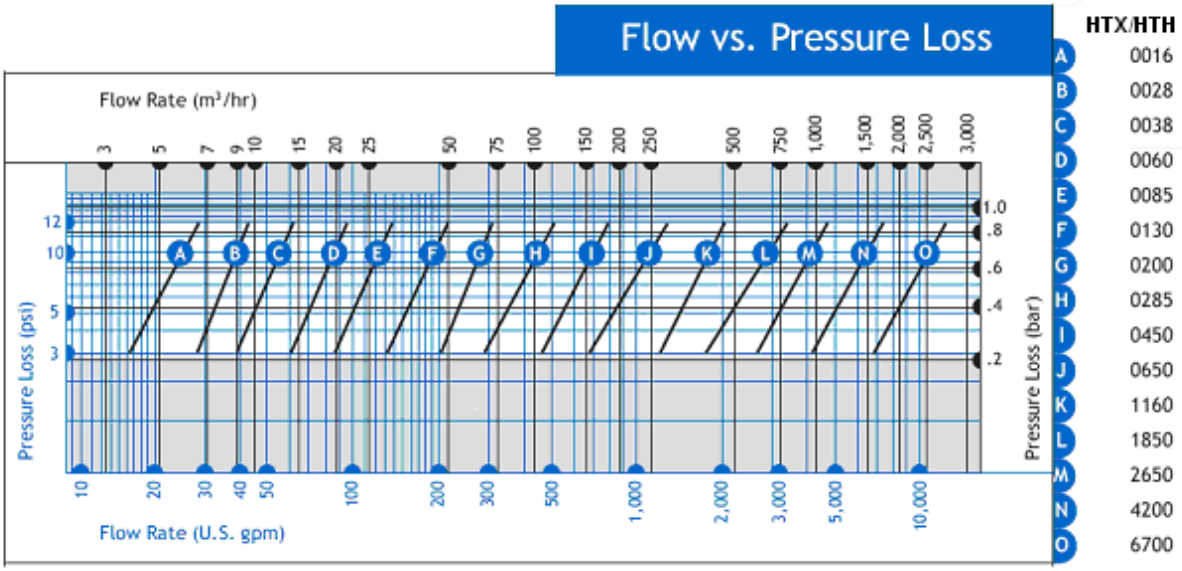
11. Down Stream Filtration:

The use of finer filtration (polishing) downstream from the separator is a common application. Be aware, however, that the barrier filter (as it accumulates more solids) causes an increasing pressure loss, which may cause the flow rate of the system to be reduced…sometimes below the recommended flow rate of the separator. This situation will often reveal itself when typical separable solids begin to show up regularly on the downstream barrier filter (leading the customer to possibly believe that the separator does not work). Always check for variations in the flow rate when down stream conditions change.

Solids Removal Chart



Flow vs. Pressure Loss



HTX/HTH SPARE PARTS LIST

(*) INDICATES HTH SPARE PARTS

HTX-0004

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 6" LG
106140	GASKET	COUPLING	3 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0010

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 7 3/8" LG
106141	GASKET	COUPLING	4 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0016

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 8 1/2" LG
106141	GASKET	COUPLING	4 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0028

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 11" LG
116443	GASKET	COUPLING	5 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0038

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 11 7/8" LG
106142	GASKET	COUPLING	6 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0060

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 16 11/16" LG
106147	GASKET	COUPLING	8 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0085

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 19 15/16" LG
106147	GASKET	COUPLING	8 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0130

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 20" LG
106147	GASKET	COUPLING	8 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0200

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 26 5/16" LG
106149	GASKET	COUPLING	10 TYPE E GROOVE	EPDM
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0285

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 27 1/16" LG
106150	GASKET	COUPLING	12 TYPE E GROOVE	EPDM
*106205	GASKET	HANDHOLE	4" x 6"	NEOPRENE
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0450

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 33 3/8" LG
116634	GASKET	COUPLING	14 TYPE E GROOVE	EPDM
*106205	GASKET	HANDHOLE	4" x 6"	NEOPRENE
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0500

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 33 3/8" LG
116634	GASKET	COUPLING	14 TYPE E GROOVE	EPDM
*106205	GASKET	HANDHOLE	4" x 6"	NEOPRENE
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-0810

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 50 1/4" LG
119488	GASKET	COUPLING	20 TYPE E GROOVE	EPDM
*106205	GASKET	HANDHOLE	4" x 6"	NEOPRENE
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-1275

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
118504	GROMMET	STRIP	15/16" x 1/4"	EPDM / 55 3/4" LG
121285	GASKET	COUPLING	24 TYPE E GROOVE	EPDM
*106205	GASKET	HANDHOLE	4" x 6"	NEOPRENE
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-1950

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
119685	GASKET	ANSI 12" HTX	28 150# 1/8 THK	NEOPRENE
*106205	GASKET	HANDHOLE	4" x 6"	NEOPRENE
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-3500

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
119702	GASKET	ANSI 16" HTX	36 150# 1/8 THK	NEOPRENE
*106205	GASKET	HANDHOLE	4" x 6"	NEOPRENE
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

HTX-6700

PART#	DESC	DESCRIPTION TWO	DESCRIPTION THREE	DESCRIPTION FOUR
120437	GASKET	ANSI 20" HTX	42 150# 1/8 THK	NEOPRENE
*106205	GASKET	HANDHOLE	4" x 6"	NEOPRENE
*118512	GKT	KIT	GAUGE, 160PSI	CARBON STEEL
*106263	GAUGE	160 PSI, 1/4 MNPT BOTTOM	2 1/2" DIAMETER FACE	GLYCERINE FILLED

NOTES:

Separator Model:_____

Sales Order #:_____

Purchase Date:_____

Distributor:_____

System Flow:_____ **Separator Delta P:**_____

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