



Technical Datasheet  
DL-SLV/ DL-SUV  
Air Operated Double Diaphragm Pumps

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## Features and Benefits

The DL-SLV and DL-SUV pumps are made of polished stainless steel with a surface finish quality of up to Ra\* 3,2 µm and FDA (Food & Drug Administration) approved elastomer materials. The pumps distinguish themselves through their rugged construction, quick & easy dismantling, CIP (Clean In Place) and SIP (Sterilize In Place). Through the use of the stainless steel frame, the pump can be easily and quickly drained/emptied after CIP.

\*Ra = roughness average

### Key Features

- ❶ Special pump design for an optimum of fluid guidance and large solid sizes
- ❷ Special V-frame for quick & easy dismantling to reduce downtime and to allow the pump to be easily & completely drained
- ❸ Suitable for CIP & SIP



### Sizes

Size (mm)	15	25	40	50	80
Suction height (m), dry	-	4	4	4	4
Max. Solid Size (mm)	-	10	16	18	25
Weight (kg)	-	21	30	57	94

Type	15 (½")	25 (1")	40 (1 ½")	50 (2")	80 (3")
<b>DL-SLV</b> - Stainless Steel 304 Polished	-	●	●	●	●
<b>DL-SUV</b> - Stainless Steel 316 L Polished	-	●	●	●	-

### Applications

The polished stainless steel housing material with austenitic forged steel has a high level of chemical and corrosion resistance, making it suitable for food processing and cleaning fluids that contain acids and alkalis, such as:

- Beverage
- Biotechnology
- Chemical
- Cosmetics
- Dairies
- Food
- Pharmaceutical

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### Temperature

Temperature Range: -25°C to +130°C

Product wetted interior	Max. Temperature (°C)
NBR	-15 to +90
EPDM	-25 to +90
EPDM grey	-25 to +90
NRS	-15 to +70
FKM	-5 to +120
DEPA nopped S <sup>4</sup> ®	-20 to +110
PTFE	-20 to +100
DEPA nopped E <sup>4</sup> ®	-10 to +130

### Marking and Identification

The pumps are provided with a nameplate containing the pump code, serial number, date of manufacture and max. allowed temperature and pressure.

The pump code provides all information about size, material and equipment, enabling accurate linkage to spare parts.

### Applied Guidelines

- ATEX compliant in accordance with directive 94/9/EC equipment group II, category 2GD, Explosion group IIB Tx (II 2 GD IIB Tx)
- Machinery Directive 2006/42/EC
- GOST certification



ATEX-compliant II 2GD IIB Tx



### Materials

	DL-SLV	DL-SUV
Housing Material	Stainless Steel 1.4301/ 304	Stainless Steel 1.4404/ 316L
Design	forged/ welded	forged/ welded
Surface	Hand/electro polished	Hand/electro polished
Quality	Ra <sup>1)</sup> ≤ 3,2 µm	Ra <sup>1)</sup> ≤ 3,2 µm
Center block	1.4301/304	1.4301/ 304
Air chamber	1.4404 electropolished	1.4404 electropolished
Outer piston cap	316L Ra <sup>1)</sup> < 3,2 µm electropolished	316L Ra <sup>1)</sup> < 3,2 µm electropolished
Diaphragm fixture	Clamp band 1.4301 electropolished	Clamp band 1.4301 electropolished
S-/D manifold	1-piece	3-pieces
Connections	Tri-Clamp DIN11851 <sup>2)</sup> SMS	Tri-Clamp DIN11851 DIN11864-1 <sup>2)</sup> SMS
Certificates	FDA <sup>3)</sup>	FDA <sup>3)</sup>

<sup>1)</sup> Ra = roughness average

<sup>2)</sup> Standard

<sup>3)</sup> For diaphragms and valve balls - EPDM-grey and PTFE/E4

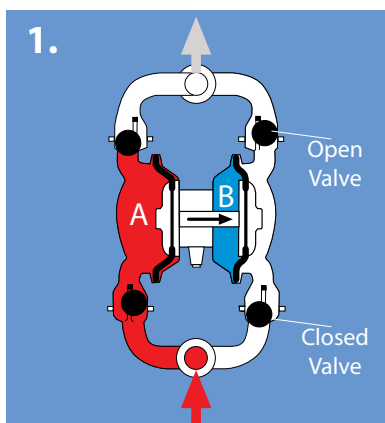
## Operation



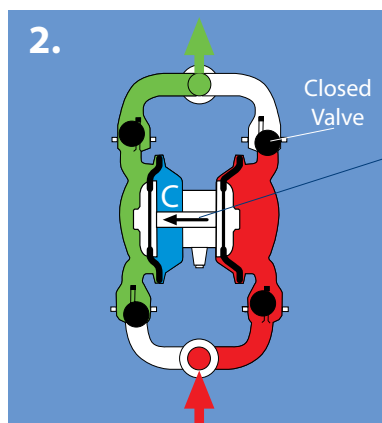
### Operation

Air-Operated Double Diaphragm Pumps work on the principle of oscillating positive displacement, with two back-to-back pump chambers. Both are divided by a diaphragm into an air and a fluid region. The two diaphragms are connected by a piston rod, creating the effect that during one cycle, fluid is expressed out of one pump chamber while being drawn into the other pump chamber. The four drawings depict the sequence of a complete cycle consisting of suction and pressure strokes, showing an empty and a "full" air-operated diaphragm pump. The fluid is presented in colour (red/green), for ease of demonstration.

- red = Medium in suction condition
- green = Medium in discharge condition

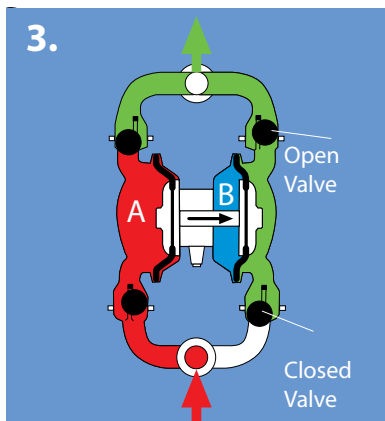


1. On start-up, pressurized air in region B (acting via connected diaphragms) lowers the pressure in chamber A.

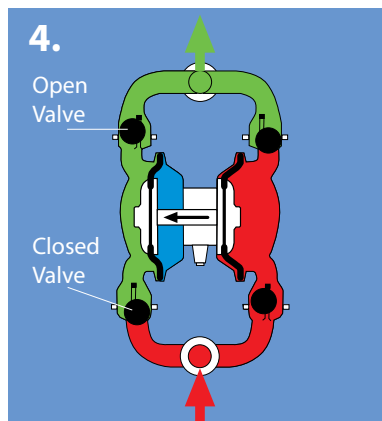


2. Pressurized air in region C acts on the diaphragm to displace product out of the pump.

End positions of inner pistons switch the control valve between alternating phases.



3. The process continues by again creating pressure in region B, this time expelling product from the pump while drawing in new product into chamber A where simultaneously a low pressure has been generated.



4. The cycle repeats by alternately producing pressure in regions B and C while the pump is in operation.

## Pump Sizes and Equipment

<b>DL</b>	<b>25</b>	-	<b>S</b>	<b>L</b>	<b>V</b>	<b>G</b>	-	<b>G</b>	-	-	-	<b>T</b>
<b>DL</b>	<b>25</b>	-	<b>S</b>	<b>U</b>	<b>V</b>	<b>G</b>	-	<b>G</b>	-	-	-	<b>T</b>






Connecting Dimension DN (mm) / inch
25 / 1"
40 / 1 1/2"
50 / 2"
80 / 3"

Material Options		
Material	Diaphragm	Valve Ball
EPDM grey	G	G
EPDM grey with core	-	X
PTFE	T	T
PTFE core	Z	Z
Stainless Steel	-	R

	Material
L	Stainless steel 304
U	Stainless steel 316 L

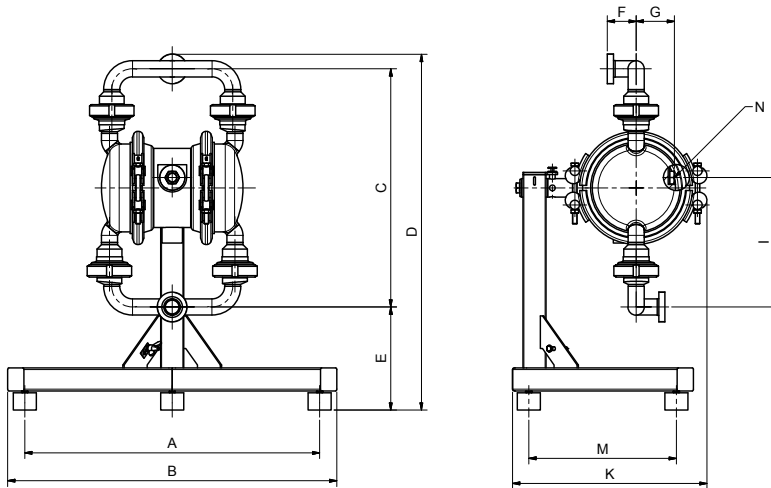
	Connections
T	Triclamp ISO
U	Triclamp DIN
Z	Triclamp ASME-BPE (Zoll)
N	SMS

### Cleaning Features

DLXX-SLV	DLXX-SUV	
1-piece S-/D Manifold Port orientation fixed	3-piece S-/D Manifold Port orientation adjustable Able to disassemble completely for improved cleaning possibility	
		
Pumps can be pivoted		
		
CIP, SIP able		
Both type can be provided for emptying of residues		

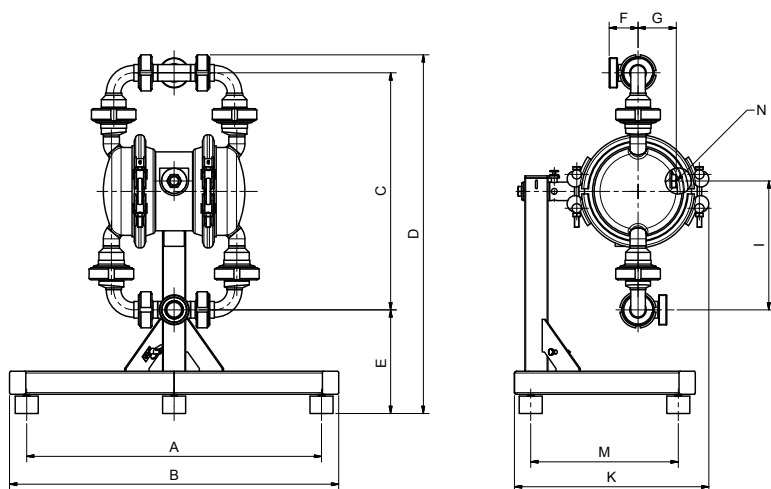
## Dimensions

### Type DL-SLV



Dimensions (mm)	Size			
	25	40	50	80
A	512	512	762	762
B	571	571	834	834
C	413	575	714	854
D	618	705	974	1063
E	179	98	221	152
F	50	55	57	100
G	67	67	123	123
I	225	306	384	453
K	337	363	495	540
M	256	256	381	381
N (air inlet)	G 3/8	G 3/8	G 3/4	G 3/4

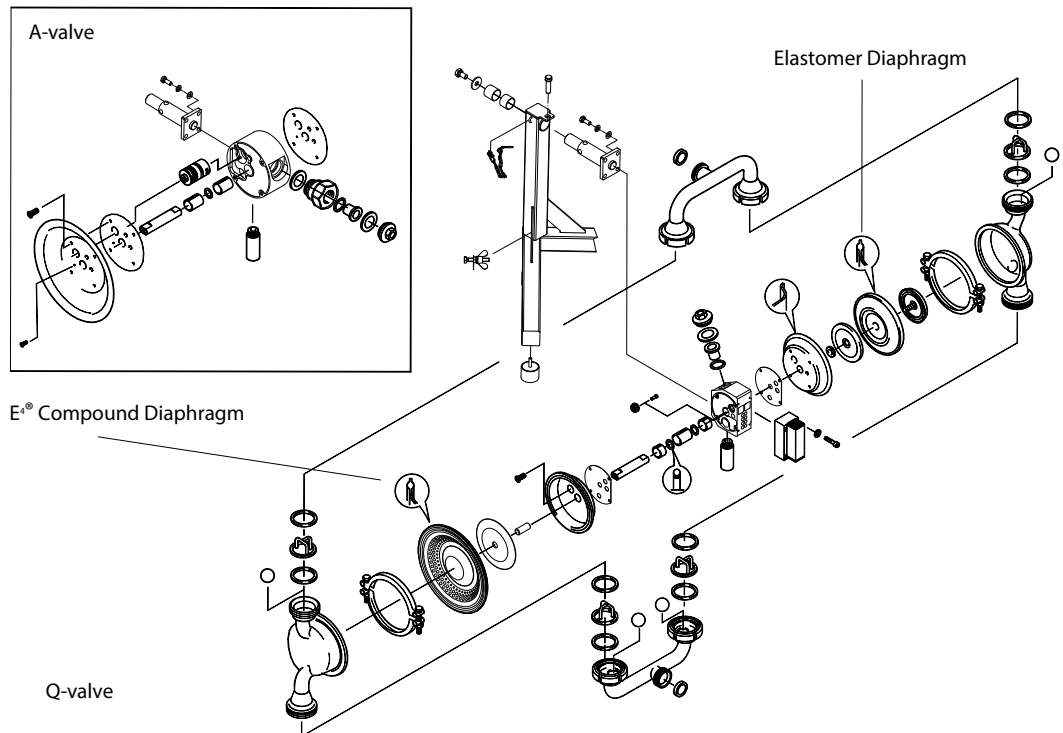
### Type DL-SUV



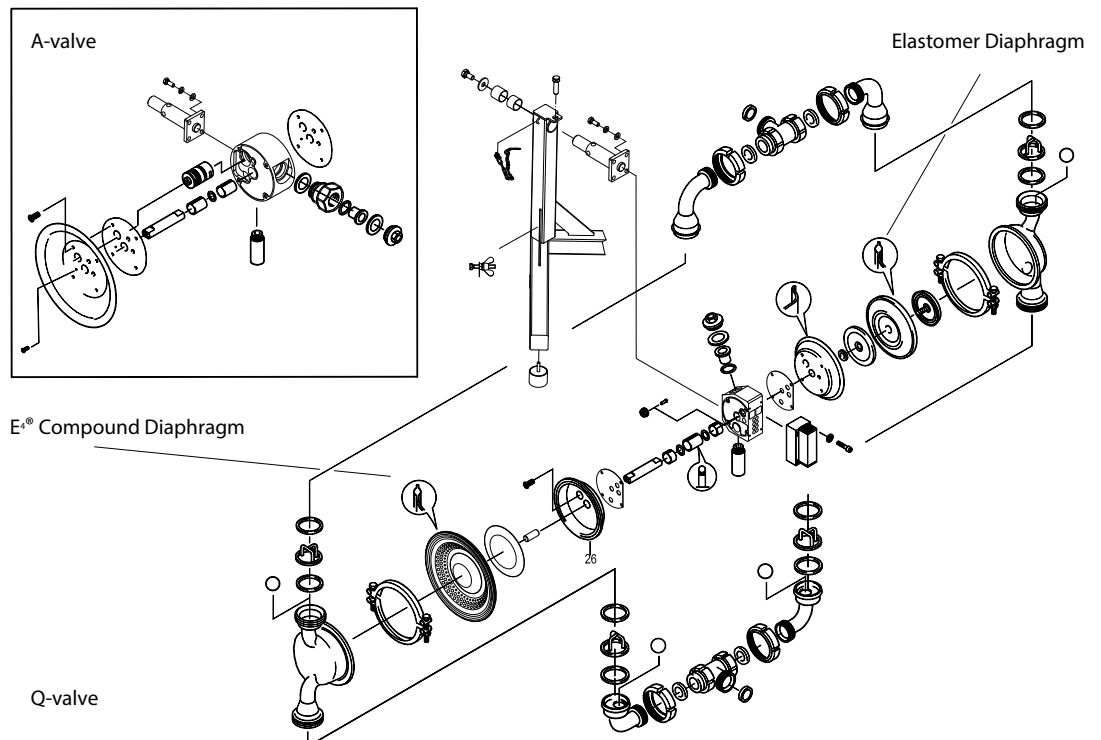
Dimensions (mm)	Size		
	25	40	50
A	512	512	762
B	571	571	834
C	415	575	714
D	624	711	981
E	178	98	221
F	50	65	70
G	67	67	123
I	225	306	384
K	337	363	495
M	256	256	381
N (air inlet)	G 3/8	G 3/8	G 3/4

Special V frame construction reduces downtime to a minimum. Pumps have been designed in such a way that all components in contact with the product can be disassembled and reassembled within a short time. This means that servicing work is reduced to an absolute minimum.

### DL25-80-SLV



### DL25-50-SUV



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## Accessories and Automation

### Active Pulsation Dampers



Air-Operated Double Diaphragm Pumps can be equipped with an active pulsation damper mounted on the discharge manifold. This minimises any remaining pulsations.

Active pulsation dampers are particularly suitable for intermittent operating conditions and, due to their integrated control, they automatically adjust to provide an optimal degree of damping. A separate air supply is required.

As with the air-operated double diaphragm pumps, a principle guiding the development of pulsation dampers is the modular use of common components.

Pulsation dampers require minimum maintenance and are, subject to the requirements of the application, available in the same housing and diaphragm materials as the pump.

### Passive Pulsation Dampers



As an alternative to the active pulsation damper, Air-Operated Double Diaphragm Pumps can also be supplied with a passive pulsation damper mounted on the discharge pipe. This type is particularly suitable for uninterrupted operating conditions.

Passive pulsation dampers are available in several housing materials - painted steel, polypropylene, or stainless steel - and, depending on the design, can be fitted with an internal diaphragm. An appropriate pulsation damper can be selected based on pump size to minimise pulsations.

### Diaphragm leakage monitoring system



In case of diaphragm failure occurs, the pumped fluid enters the air chamber and triggers the sensor. The sensor sends subsequently an electrical output to the monitoring device for evaluation of the signal. The control unit switches off the air supply to the air valve, and thus halting the operation of the pump.

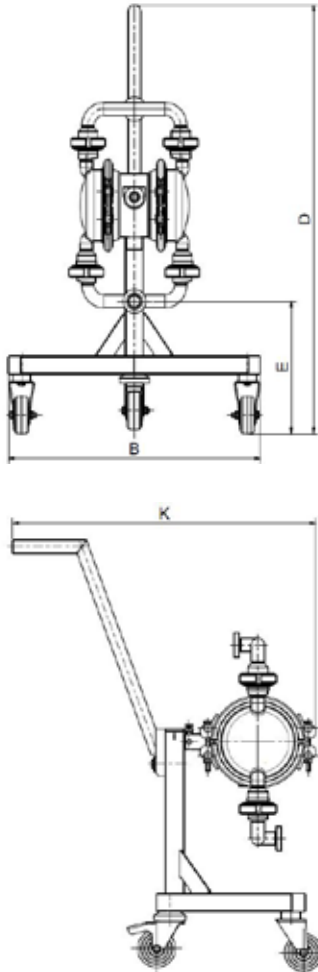
Two sensors per pump (one per chamber) are installed.

Two types of sensors are available:

- Conductivity Measurement, Standard (orange) for conductive products
- Capacity System, ATEX (blue) for non-conductive products and approved for ATEX-certified pumps.



### Type DL-SLV/SUV with Mobile Unit



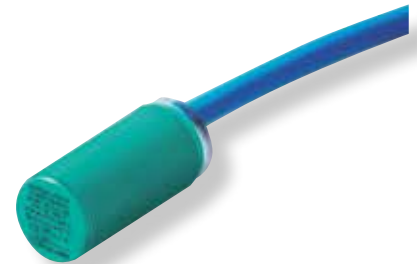
Dimensions (mm)	Size (SLV/SUV)			
	25	40	50	80
B	571	571	834	834
D	915	915	1082/1089	1171
E	284	203	328	260
K	642	668	730	775

### Slow Start Up Valve



For pumps that have not been primed for operation, the unthrottled opening of the compressed air supply can create severe loads on housing materials and diaphragms, resulting in a unwanted wear. These pressure shocks can be mitigated by increasing operating pressure in a slow and gradual manner. To automate this process, we have produced our Slow Start-Up Air Valve that can be used with all pumps.

### Stroke Counter



The stroke counter sensor counts each cycle of the diaphragm movement. Multiplying the number of cycles with the pump chamber volumes, the discharge flow rate can be determined. For dosing applications, the stroke counter provides for precise measurement and accurate regulation.

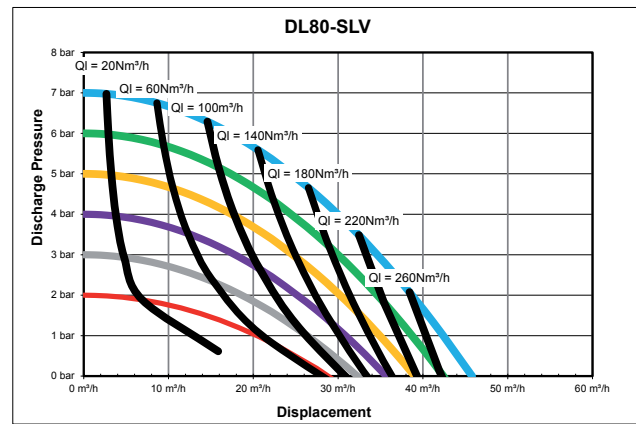
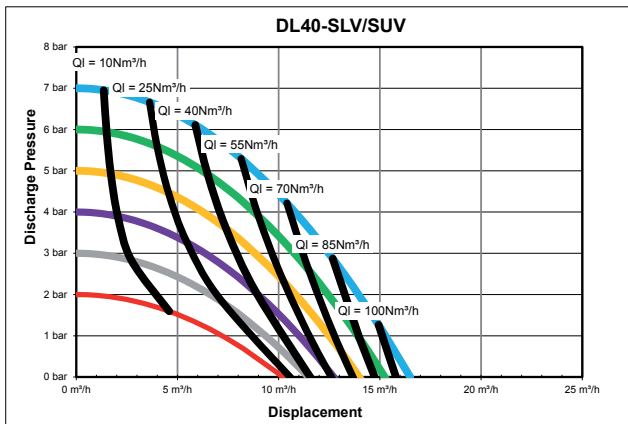
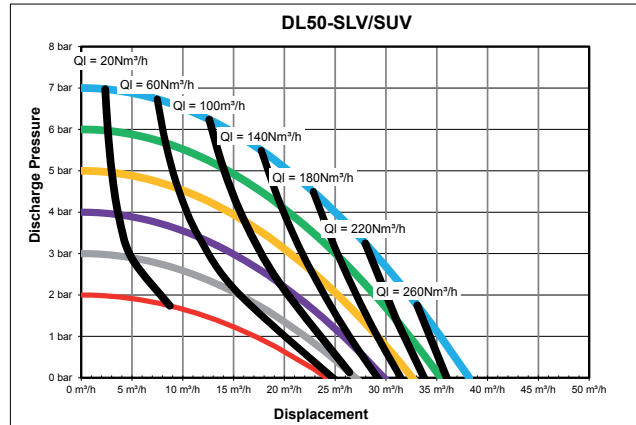
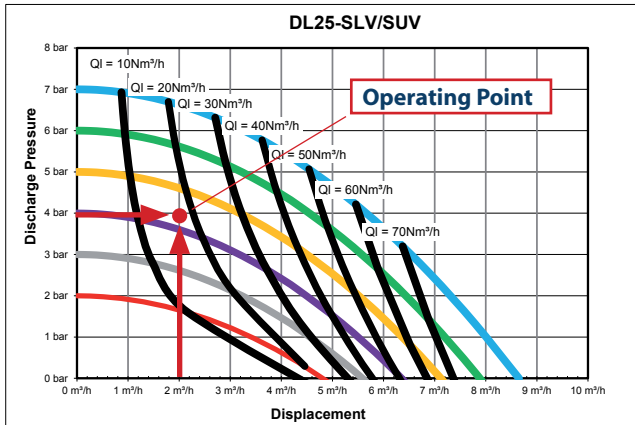
The stroke counter sensor is located within the center block and provides an electrical output each time the diaphragm is in the end position.

The stroke counter consists of a sensor and an electronic amplifier/regulator. The sensor can be used in ATEX certified pumps.

## Performance Curves

### Example for pump selection

Required is 2 m<sup>3</sup>/h as the flow rate at a discharge pressure of 4 bar. Recommend is the DL 25 for this application. The needed air supply pressure is 4,3 bar. This equals an air consumption rate of 17 Nm<sup>3</sup>/h.





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