



## Data Sheet

# Millistak+<sup>®</sup> Pod Carbon Filter System

**High affinity and adsorption in the innovative Pod format**



Millistak+ CR Series clarification/prefiltration filters incorporate a carbon-impregnated media for the removal of color and trace contaminants. Carbon is a complex material and each application requires distinct adsorption characteristics to achieve the desired result. Its adsorptive affinity for a particular impurity can vary depending on the nature of the impurity and the actual process liquid chemistry.

Millistak+ CR Series media is formulated with carbon retained in a rigid structure by a cellulose matrix. These materials, combined with a state-of-the-art manufacturing process, create a tortuous flow path that insures maximum impurity contact with the surface and pores of the activated carbon, for optimum impurity adsorption.

The superior performance of Millistak+ CR Series media is offered in the scalable and disposable Pod format. Accommodating applications from lab to pilot to process scale, the Pod format offers greater flexibility with its unique modular design.

## Benefits

- Encapsulated format, eliminating dust and preventing inhalation for maximum operator safety
- No secondary filtration or clarification for removal of bulk carbon required
- Shorter process time
- Minimum disposal cost

## MILLISTAK+ ADVANTAGES OVER POWDERED ACTIVATED CARBON

Millistak+ CR series media, an activated carbon with a charged resin binder forms a rigid matrix, which quantitatively retains more contaminants than the equivalent weight of bulk powdered carbon. The rigid matrix of the Millistak+ media forces the liquid stream to sustain intimate contact with the activated carbon on the surface and within the pores of the carbon particles.

Powdered activated carbon removes contaminants from a liquid by adsorbing the contaminants on the

pore walls of the carbon. The impurities are held by a weak electrostatic force known as "Van der Waals Force." Filtering removes the powdered carbon but often channeling occurs where the liquid passes through openings in the bed of bulk carbon.

Millistak+ offers single-pass operation and high flow rate conditions for speed and convenience. Bulk powdered carbon requires long contact time between the carbon and the liquid to reach adsorption equilibrium prior to filtration. Millistak+ media provides speed, convenience, and optimal performance particularly when compared to the adsorptive capacity of competitive carbons.

### Comparison of Bulk Powdered Carbon and Millistak+ Carbon POD Filter

	Bulk Powdered Carbon	Millistak+ Carbon Pod Filter
<b>Dustiness</b>	Very fine powder that readily aerated when unpacked and handled.	Compressed sheet form eliminates dust.
<b>Health Hazards</b>	Prolonged inhalation of loose carbon can result in lung disease.	Encapsulated to prevent inhalation.
<b>Safety</b>	In certain production environments, PAC dust can be a fire hazard.	No carbon in atmosphere for maximum safety.
<b>Secondary Filtration Required</b>	After bulk carbon treatment, slurry must be filtered for removal of the spent carbon.	No secondary filtration required.
<b>Labor Intensity</b>	Requires cleaning dosage tanks and piping for the removal of slurry from carbon fines before sterile filtration. Residual bulk carbon is difficult to remove and can result in batch- to-batch contamination.	Instant filter disposal after use. No cleaning required.
<b>Extended Process Times</b>	Use of bulk carbon requires mixing slurry for 1 hour or more to reach adsorption equilibrium prior to processing the batch.	Quicker achievement of equilibrium for shorter process time.
<b>High Disposal Costs</b>	After filtration of slurry, customer must deal with difficult disposal of the loose carbon retained on the filter septum.	Minimal disposal cost.

## PYROGENICITY

Millistak+ media is tested for the detection of pyrogens prior to release. The filter extracts must contain less than 0.25 EU/mL via LAL clot test techniques. Additionally, the Millistak+ Pod with CR media meets the following criteria:

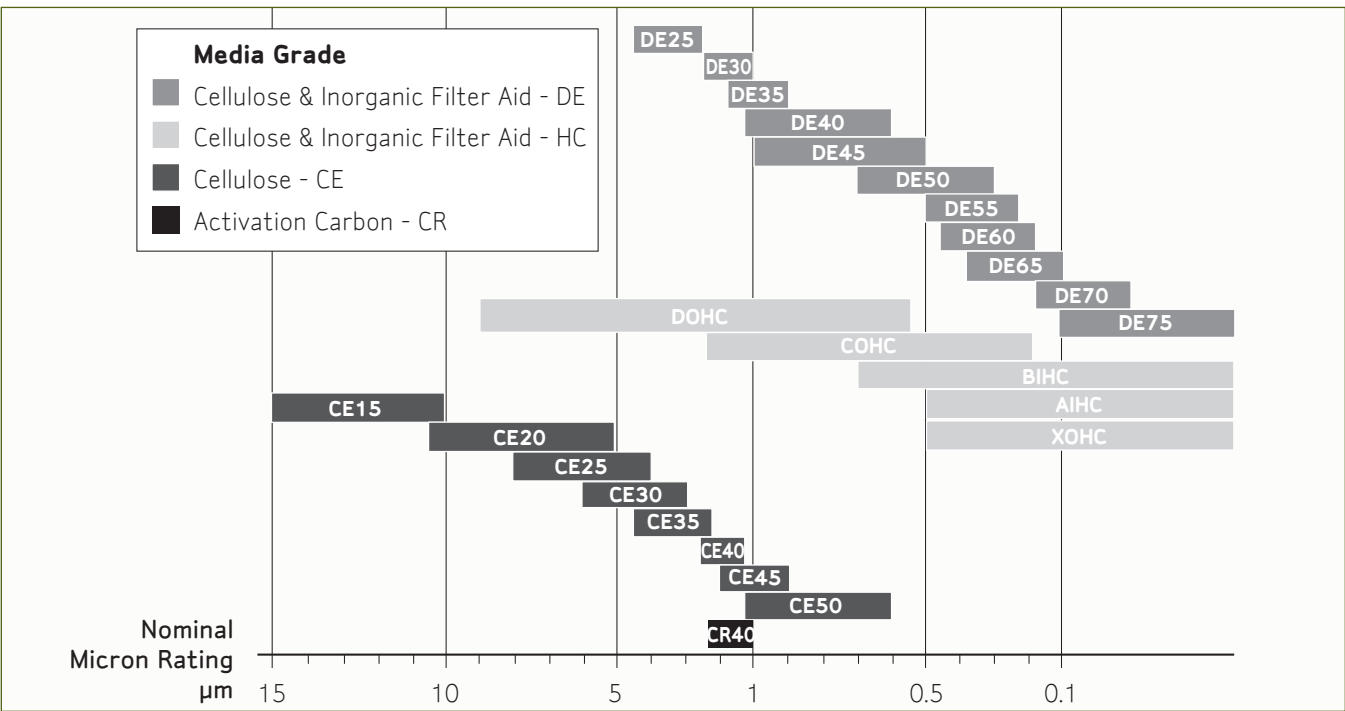
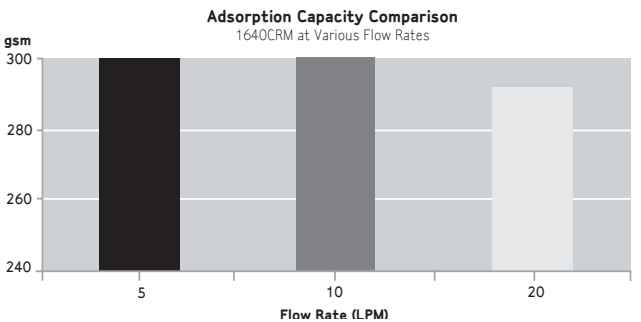
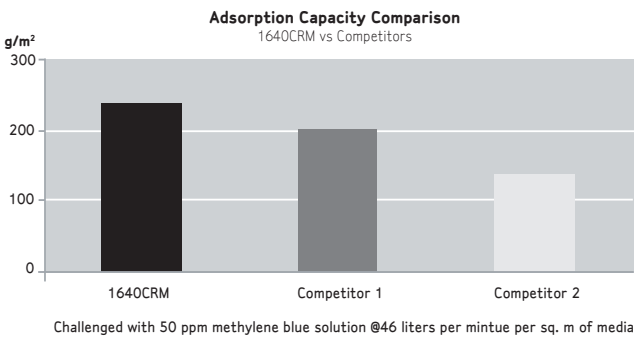
- USP Class VI compliance
- 21CFR compliance
- 100% free of Animal Derived components

Typical Extractable Metals	
Element	mg/ft <sup>2</sup> media
Aluminum (Al)	≤ 0.033
Barium (Ba)	≤ 0.003
Boron (B)	≤ 0.039
Calcium (Ca)	≤ 1.505
Copper (Cu)	≤ 0.035
Iron (Fe)	≤ 0.001
Lead (Pb)	≤ 0.001
Magnesium (Mg)	≤ 1.129
Manganese (Mn)	≤ 0.624
Sodium (Na)	≤ 17.513
Strontium (Sr)	≤ 0.006
Titanium (Ti)	≤ 0.012
Vanadium (V)	≤ 0.008
Zinc (Zn)	≤ 0.046

## WIDE RANGE OF SIZES

Whether you need to do laboratory scale work, pilot studies for scaling, or full-scale manufacturing, Millipore has a device size to suit your needs and process volumes.

The minicap format offers 23m<sup>2</sup> of surface area for laboratory and screening trials. The lab scale Pod (0.027 and 0.054 m<sup>2</sup>) is available when the process volumes dictate a move to preliminary scaling studies. Finally, pilot and process scale devices (0.11, 0.55, and 1.1 m<sup>2</sup>) are available for pilot and full scale manufacturing.



## APPLICATIONS

Activated carbon is a very versatile process aid and has a high affinity and adsorption capacity for odorous compounds and color bodies over a wide range of molecular weights.

### Application of Millistak+ Activated Carbon

Application	Color Removal	Odor Removal	Haze Removal	Organic Impurities
SVP	X			
LVP	X			
Antibiotic	X			
Vitamin	X	X		
Enzymes	X	X		
Vaccine			X	
Plasma				X
Process Water		X		

### Millistak+ Pod Filter Specifications

Surface Area	1.2 ft² (0.11 m²)	5.9 ft² (0.55 m²)	11.8 ft² (1.1 m²)
Materials of Construction			
Filter Media:	DE & HC	Cellulose Fibers with inorganic filter aid	
	CE	Cellulose Only	
	CR	Cellulose Fibers with activated carbon	
Filter Membrane:	Mixed esters of cellulose (grades A1HC and B1HC only)		
Pod Housings:	Glass Filled Polypropylene		
Adapters:	Glass Filled Polypropylene*		
Gaskets and Plugs:	Thermo Plastic Elastomer (TPE)*		
Pod Dimensions			
Length:	24.2 in. (62 cm)	24.2 in. (62 cm)	24.2 in. (62 cm)
Height:	12.5 in. (32 cm)	12.5 in. (32 cm)	12.5 in. (32 cm)
Thickness:	1.2 in. (3 cm)	2.8 in. (7.1 cm)	4.8 in. (12.2 cm)
Maximum Operating Pressure	50 psig (3.5 bar) at 25 °C; 15 psig (1.0 bar) at 80 °C		
Maximum Differential Pressure			
Forward:	30 psid (2.1 bar) at 25 °C; 15 psid (1.0 bar) at 80 °C		
Reverse:	30 psid (2.1 bar) at 25 °C		
Sterilization	May be autoclaved for 1 cycle of 60 minutes at 123 °C.		
Indirect Food Additive	All components meet the FDA indirect food requirements cited in 21 CFR 177-182.		
Toxicity	All component materials meet the requirements of the current USP <88> biological reactivity test for class VI plastics.		
Bacterial Endotoxin	< 0.25 EU/mL as determined by the Limulus Amebocyte Lysate (LAL test).		
CE Pressure	This filter has been designed and manufactured according to the essential requirements of the Pressure.		
Equipment Directive	Equipment Directive 97/23/EC. Only 1.1 m² filters carry the CE mark.		

\* Pilot and process scale only.

## Millistak+ Pod Filter Specifications (continued)

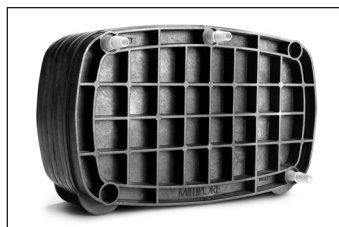
<b>Surface Area</b>	0.29 ft <sup>2</sup> (0.027 m <sup>2</sup> )	0.58 ft <sup>2</sup> (0.054 m <sup>2</sup> )
<b>Materials of Construction</b>		
Filter Media:	DE & HC Cellulose Fibers with inorganic filter aid CE Cellulose Only CR Cellulose Fibers with activated carbon	
Filter Membrane:	Mixed esters of cellulose (grades A1HC and B1HC only)	
Pod Housings:	Glass Filled Polypropylene	
Adapters:	Glass Filled Polypropylene*	
<b>Pod Dimensions</b>		
Length:	8.5 in. (22 cm)	8.5 in. (22 cm)
Height:	5.3 in. (14 cm)	5.3 in. (14 cm)
Thickness:	2.9 in. (7 cm)	3.7 in. (9 cm)
<b>Maximum Operating Pressure</b>	30 psig (2.1 bar) at 37 °C	
<b>Maximum Differential Pressure</b>		
Forward:	30 psid (2.1 bar) at 37 °C; 30 psid (2.1 bar) at 40 °C	
Reverse:	30 psid (2.1 bar) at 37 °C	
<b>Sterilization</b>	May be autoclaved for 2 cycles of 60 minutes at 123 °C	
<b>Indirect Food Additive</b>	All components meet the FDA indirect food requirements cited in 21 CFR 177-182.	
<b>Toxicity</b>	All component materials meet the requirements of the current USP <88> biological reactivity test for class VI plastics.	
<b>Bacterial Endotoxin</b>	< 0.25 EU/mL as determined by the Limulus Amebocyte Lysate (LAL) test.	

\* Pilot and process scale only.

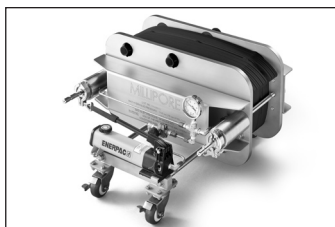
## Millistak+ Pod Holder Specifications\*\*

Surface Area	Pilot Scale	Process Scale
Materials of Construction		
Manifold:	N/A	316 L stainless steel
Diverter plate:	Polypropylene	Polypropylene
End plates:	304 stainless steel	304 stainless steel
All metal surfaces in contact with process fluids		316L stainless steel
Manifold surface finish, internal		Electropolished, Ra <0.5 μm (<20 micro-inches)
All metal surfaces not in contact with process fluids	304 stainless steel	304 stainless steel
TC gaskets	EPDM	EPDM
TC clamp	304 stainless steel 2 piece clamp	304 stainless steel 2-piece clamp
Performance Properties	Capable of supporting and sealing Pod filters up to 50 psig maximum operating pressure at 25 °C. Inlet and outlet connection to the Pods and vents are via disposable adapters.	
Maximum differential pressure		
Forward:	50 psid (3.5 bar) at 25 °C; 15 psid (1.0 bar) at 80 °C	
Reverse:	30 psid (2.1 bar) at 25 °C	
Regulatory Information	Sealing materials and plastics in contact with the product meet USP <88> biological reactivity test for Class VI plastics and are Title 21 CFR 177.2600 and 177.1550 compliant.	

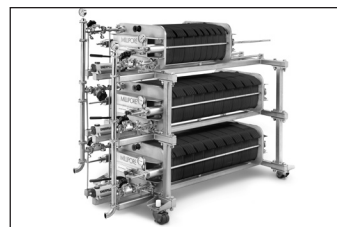
\*\* No holder required for lab scale pod



**Lab Scale:**  
HC: 270–540 cm<sup>2</sup>



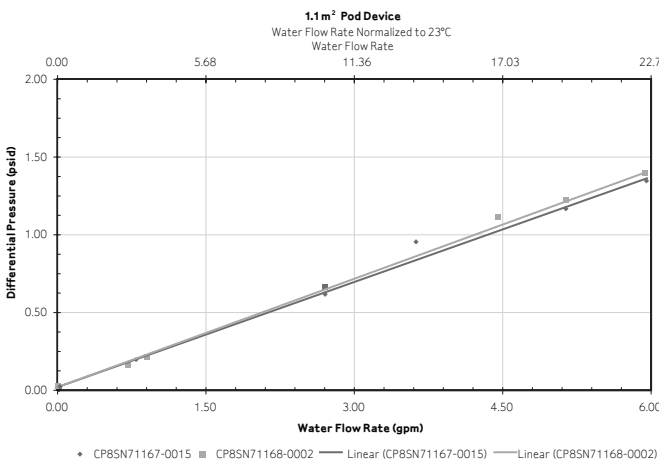
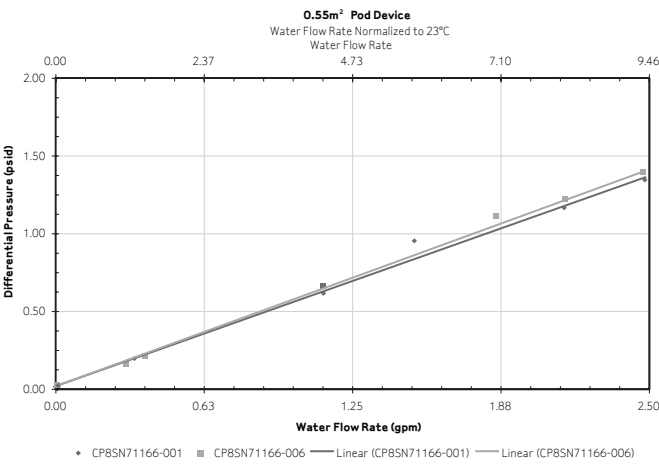
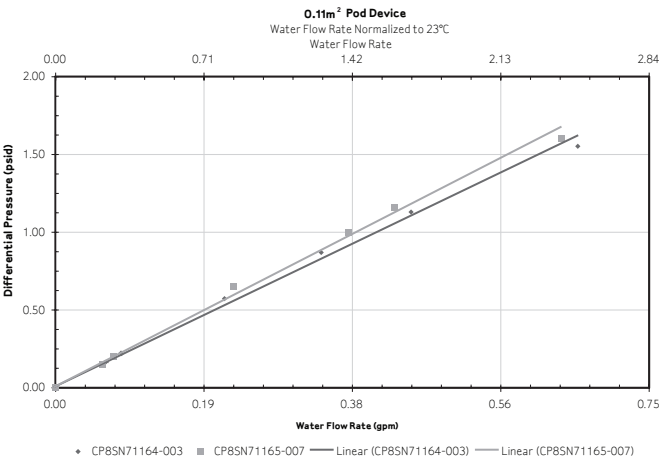
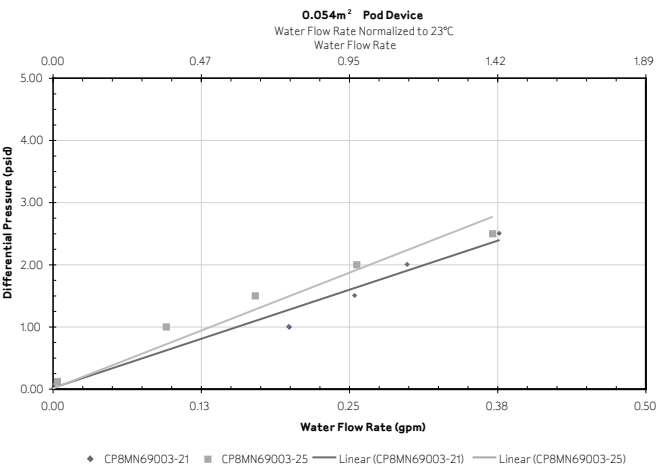
**Pilot Scale:**  
HC: 0.11–5.5 m<sup>2</sup>



**Process Scale:**  
HC: 5.5–33 m<sup>2</sup>

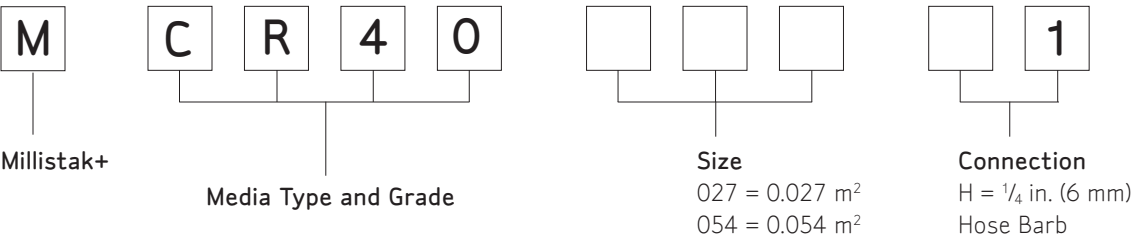
# Millistak+ Carbon Pod Devices

Please Note: Two devices were tested for each filter size.

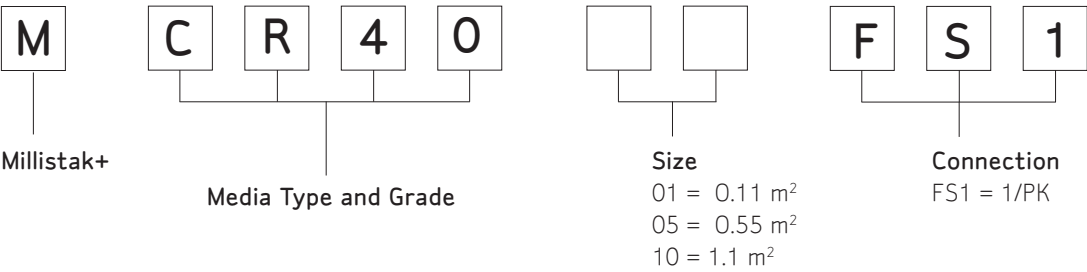


# ORDERING INFORMATION

## Lab Scale Pod



## Pilot & Process Scale Pod



Description	Qty/Pk	Cat. No.
<b>Pilot Scale Holder</b>		
For Pod configurations from 1 to 2 filters	1	MP0DPIL0T
<b>Process Scale Holders</b>		
1-rack holder; for 5 to 10 filters; Gemu® valves	1	MP0DSYS1A
1-rack holder; for 5 to 10 filters; ITT valves	1	MP0DSYS1B
1-rack holder; for 5 to 10 filters; no valves	1	MP0DSYS1N
1-rack expansion kit; for 5 to 10 filters; no valves or casters	1	MP0DSYS1X
2-rack holder; for 5 to 20 filters; Gemu valves	1	MP0DSYS2A
2-rack holder; for 5 to 20 filters; ITT valves	1	MP0DSYS2B
3-rack holder; for 5 to 30 filters; Gemu valves	1	MP0DSYS3A
3-rack holder; for 5 to 30 filters; ITT valves	1	MP0DSYS3B

## ORDERING INFORMATION

Description	Catalogue No.
<b>Holder Replacement Parts*</b>	
Hydraulic pump	MPODHYPUMP
Hydraulic system pressure gauge	MPODHYGAGE
Hydraulic fluid	MPODHFLUID
Clamp insert	MPODINSERT
1.5 in. TC stainless steel clamp for use with MPODINSERT	YY2004045
Clamp rod knob	MPODCRKN0B
Clamp rod for 2 filters	MPODCR0D02
Clamp rod for 5 filters	MPODCR0D05
Clamp rod for 10 filters	MPODCR0D10
Manifold elbow, 90°, 1.5 in. 316 stainless steel	MPODSSELBO
Manifold tee, 1.5 in. 316 stainless steel	MPODSSTEE
Manifold spool, 1 in. x 6.60 in. L	MPODMANSPH
Manifold spool, 1.5 in. x 13.16 in. L	MPODMANSPV
Manifold bracket assembly	MPODMANBRK
Replacement diaphragm for 1 in. Gemu MPODVALVEA	MPODVLVADIA
Replacement diaphragm for 1 in. itt MPODVALVEB	MPODVLVBDIA

\*Consult Millipore for replacement part and accessory availability.

Description	Qty/Pk	Catalogue No.
<b>Holder Accessories*</b>		
Pilot holder expansion kit		
Allows for Pod configurations up to 5 filters	1	MPODPILOTX
Disposable adapter kit**		
3 through adapters, 3 blind adapters	1	MPODADAPT
Disposable adapter kit**		
6 through adapters, required if using MPODDIVERTR	1	MPODADPTF
1.5 in. TC sanitary gauge, 0 – 4 bar (0 – 60 psi)	1	MPOD60PSIG
1.5 in. TC EPDM gasket	10	HGTC150EP
1.5 in. TC stainless steel clamp	1	YY2004045
Diaphragm valve, 1 in. Gemu	1	MPODVALVEA
Diaphragm valve, 1 in. ITT	1	MPODVALVEB
Disposable diverter plate	10	MPODDIVERTR

\*Consult Millipore for replacement part and accessory availability.

\*\*The disposable adapter kit must be ordered with individual Pod filters in order to install the Pod in the holder.



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