

# SATRON VOD Turbidity and solids sensor for food and Biopharma

BA202  
rev. 1.1  
18-07-2019

The SATRON VOD analyzer allows savings to be obtained in process industries such as:

- Impurities monitoring of clean water
- Detection of yeast after the membrane in breweries
- Integrity monitoring of filters
- Whey turbidity on separator discharge

The transmitter uses fully flat front process side flushing and communicates via 4...20mA and digitally using the HART® protocol.



Pipe to be ordered separately

## TECHNICAL SPECIFICATIONS

### Measuring range

0...1 500 NTU equivalent on 1,5" pipe  
0...1 000 NTU equivalent on 2" pipe  
0...200 NTU equivalent on 3" pipe  
0...50 NTU equivalent on 4" pipe

### Calibration

The transmitter is factory calibrated at 4mA = water, 20mA = full asorption. freely adjustable with pushbuttons or Hart® modem.

### Damping

Time constant adjustable 0.01 to 60 s.

### Repeatability

0.1% from maximum span.

### Response time

0.1s (with less than 0.1s damping)

### Accuracy

0...50 NTU 0.2%  
0...1 500 NTU 1%

### Unit selection

%, NTU, FNU, FTU, mg/L, g/dm<sup>3</sup>, PPM

### Temperature limits

Ambient: -30 to +80 °C  
Display operating range: 0 to +50 °C  
(Does not affect operation of the transmitter)

Process N type: -5 to +100 °C

(120 °C for 10min)

Process H type: -5 to +140 °C

(160 °C for 30 min)

Shipping and storage: -40 to +80 °C

Output 3-wire (3W), 4-20 mA

### Supply voltage

Nominal 24 VDC, (21,6 - 27,6V) 200mA

Humidity limits 0-100 % RH

## CONSTRUCTION

### Materials:

Sensing element <sup>1)</sup>: AISI316L, Duplex (EN. 1.4462), Hast. C276/C22, or Titanium Gr2.

Surface quality: Polished Ra <0,8µm

Lens: Sapphire or Spinel ceramic

Cable Material of slave probe: PE

### Pressure class:

- PN40  
- Test pressure -1 to 250 bar (-14.5 to 3625 PSI)

### Housing with display, codes NOS & NOT:

Housing: AISI303/316, Seals: Nitrile-rubber and Viton®, Nameplates: Polyester

### Housing with M12 connector, code HOT:

Housing: AISI303/316, Seals: Viton® and NBR.

### Housing with PLUG DIN 43650 connector, code HOS:

Housing: AISI303/316, Seals: Viton® and NBR.

PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

### Connection hose between sensing element and housing

Codes L

PVC signal cable or hose protected with PTFE/AISI316 braiding

### Electrical connections

Housing with PLUG connector, code

HOS:

Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm<sup>2</sup>.

Housing with M12 connector, code HOT:

M12 plug connector

Housing with display, code NOS:

Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm<sup>2</sup>.

Housing with display, code NOT:

M12 plug connector

### I/O-connections

Current output1 Turbidity active

Range (Namur NE 043) 3.5...23 mA

Maximum load 600 Ω

Factory setting 4...20 mA

### bout1-3

Relay, grounding contact

Maximum voltage 35 V

Maximum current 50 mA

Maximum leakage current 10 µA

### bin1-3

NC (no connection) OFF

0...2 V ON

Minimum values for switch in use

Voltage 16 V

Current 4 mA

Leakage current 1 mA

Current output2

Internal power supply

Current output 2 has same ground as binary IO

Maximum load 400 Ω

Range 3.5...23 mA

Factory setting 4...20 mA

External power supply

Current output 2 is galvanically isolated

Maximum supply voltage 35 VDC

Range 3.5...23 mA

Factory setting 4...20 mA

Maximum isolation voltage 100 VDC

### Process connections of the sensor

- Tuchenhangen Type "N"

Protection class: IP66, IP67 See

Selection chart.

### Weight

Housing with PLUG DIN43650

connector (HOT): 1 kg

Housing with M12

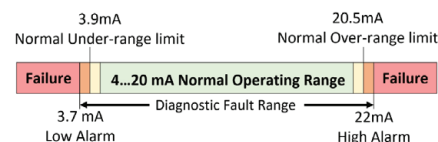
connector (HOS): 1 kg

Housing with display

(NOS & NOT): 1.3 kg

Remote Housing (L): 2.5 kg

Min. load using HART®-communication



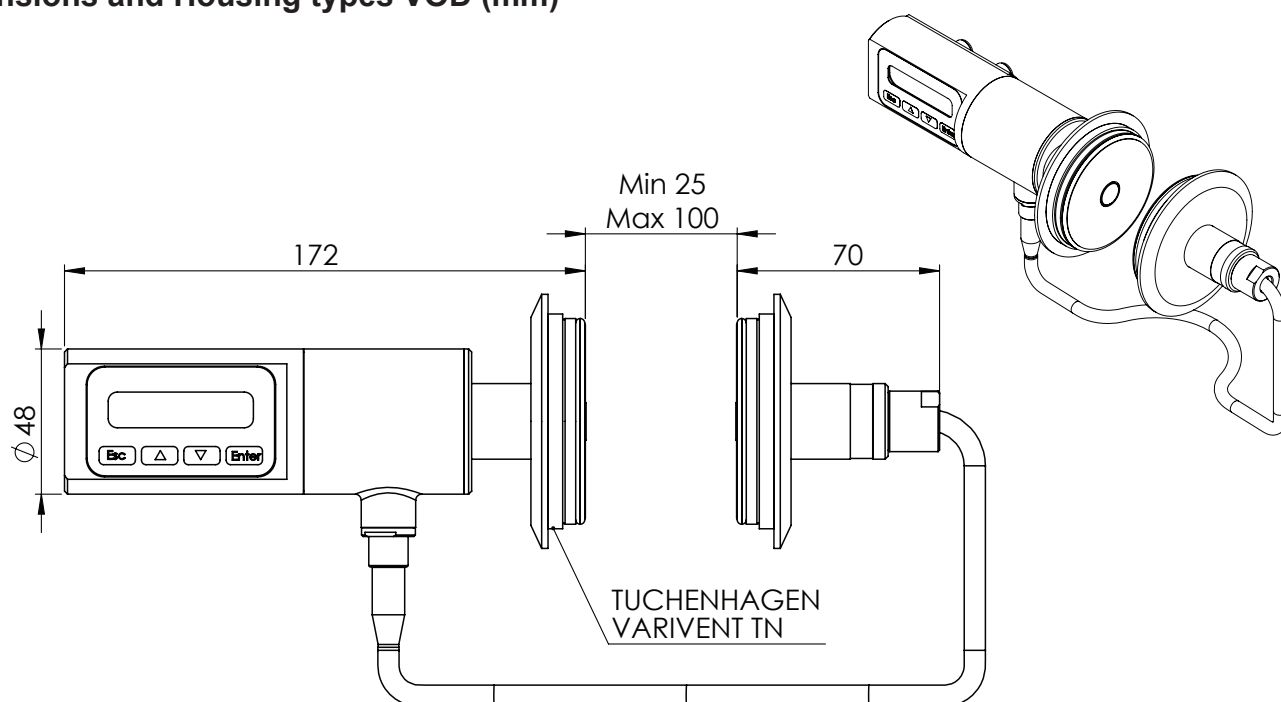
UL 61010-1, 3rd Ed. Rev May 11. 2012  
CAN/CSA C22.2 No. 61010-1-12, Ed. 3  
EMC directive 2004/108/EC

- EN 61326-1:2005

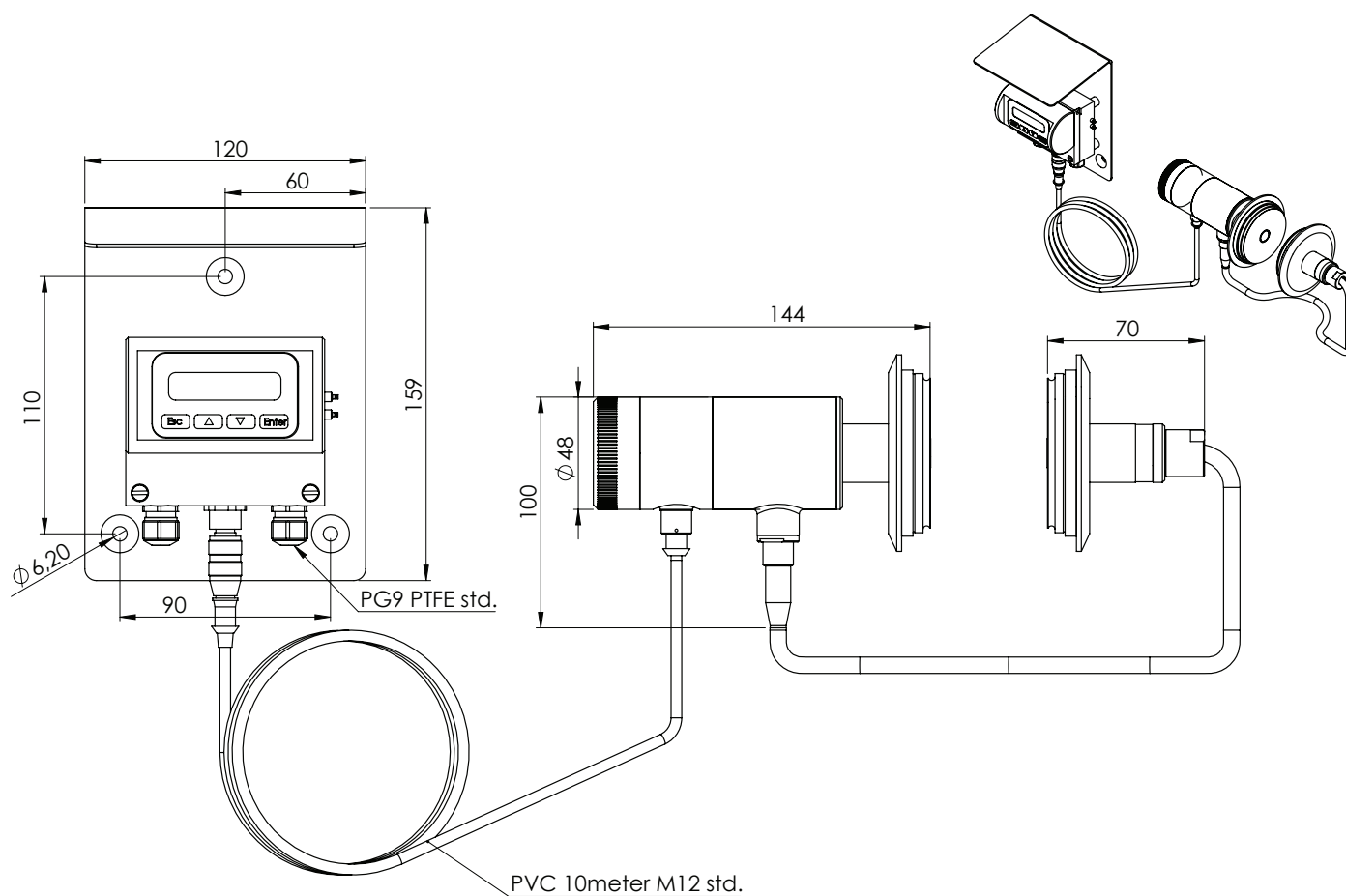
<sup>1)</sup> Parts in contact with process medium compliant to FDA

## SATRON VO Turbidity and solids content sensor

### Dimensions and Housing types VOD (mm)

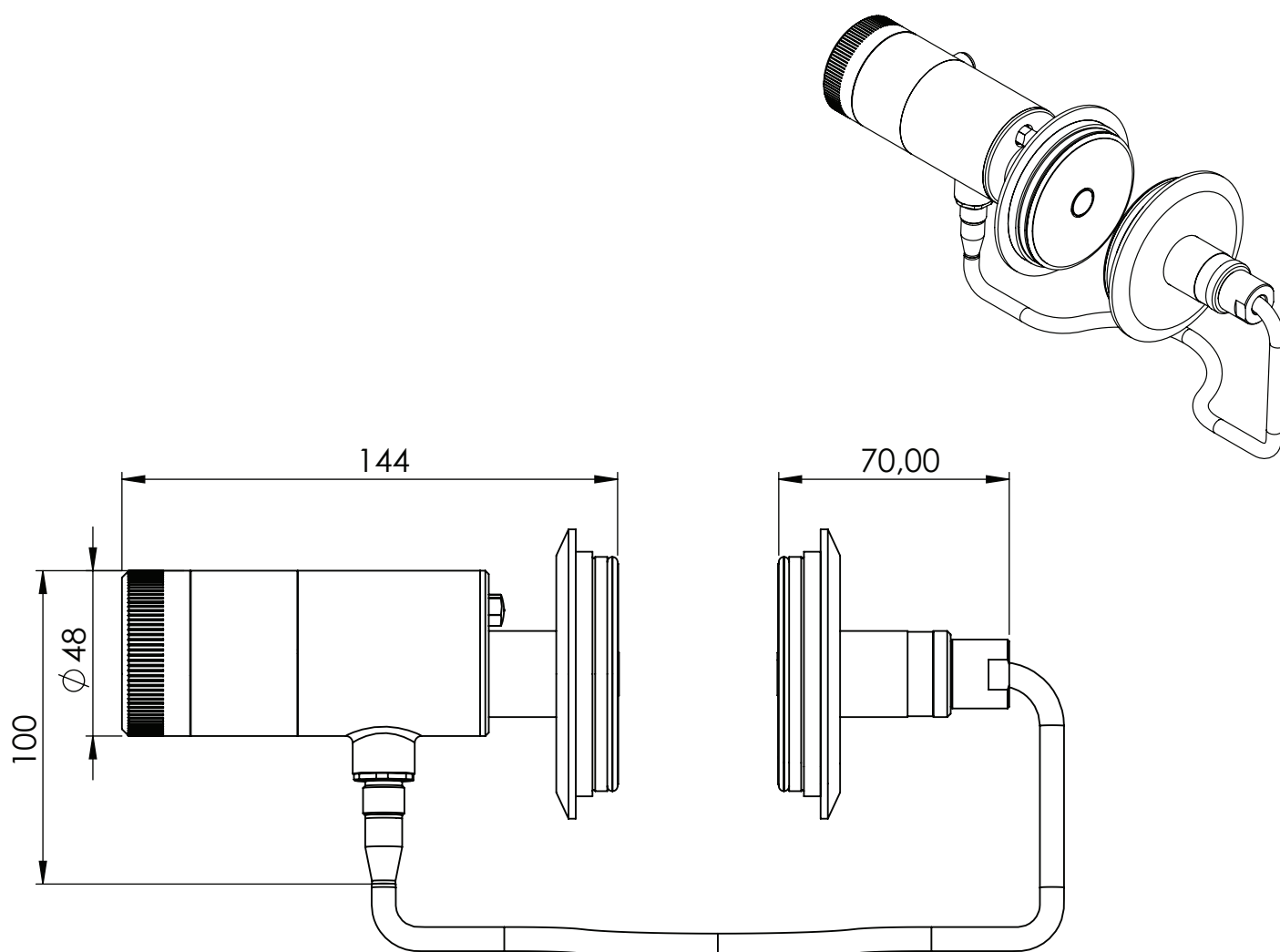


### VOD with display and pushbuttons (N housing)



### VOD with remote electronics housing with display (L housing)

# SATRON VO Turbidity and solids content sensor



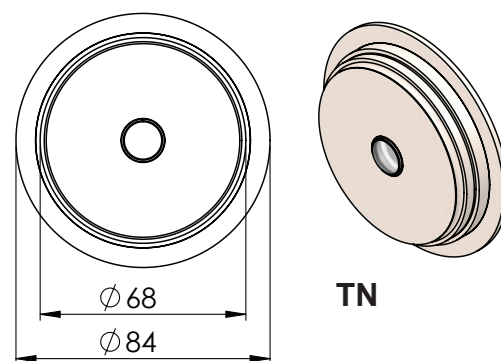
VOD with no display (H-housing)

# SATRON VO Turbidity and solids content sensor

## Process connection details

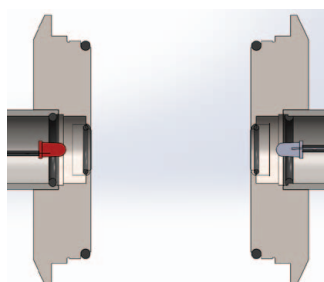
The Satron VOD is equipped with a VARLININE process connection TYPE N.

Several pipe diameters are commercially available. Change of pipe will require a recalibration of the sensor.



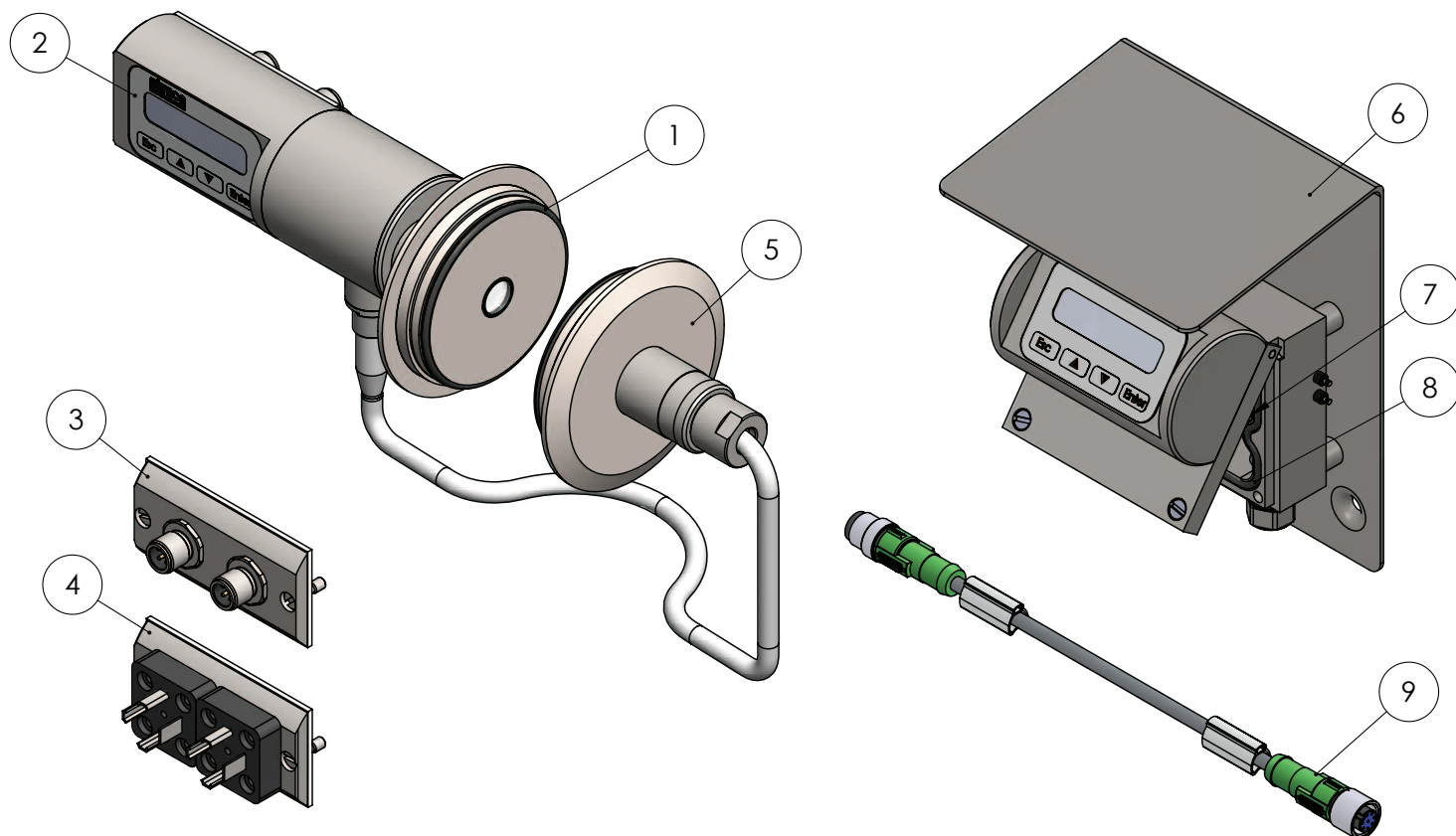
## VOD measurement principle:

Turbidity measurement according absorption with selectable wavelength LED lightsources (see selection chart). The LED (in red) sends light through the process and is received by the photodetector (in grey). Depending on the turbidity the amount of light received by the photodetector will change. The lifetime for the optical LED and photodetectors is 20 years minimum.



# SATRON VO Turbidity and solids content sensor

## Spare-parts VOD



No.	Part name	Order code	Note
1	O-ring EPDM	80036203	3A 18-03 Class II (Do not exceed above 8% fat content).
1	O-ring FPM	80016203	3A 18-03 Class I
1	O-ring FFPM(Kalrez®)	80046203	3A 18-03 Class I
2	Sticker	T1325215	
3	Plug cover M12	T1325031	
4	Plug cover DIN43650	T1325003-K48	
5	Slave probe	T1325012-xxx-TN	Contact satron
6	Remote Display Unit RDU	T13250016	
7	FUSE for L-Housing	74212000	
8	Seal for L-Housing display	80017226	
9	L-Housing data cable 10m PVC	70000450	
9	L-Housing data cable 15m PUR	70000440	

Adjustability	Span, min	Span, max
VOD with a 1,5" pipe	0...200 NTU	0...1 500 NTU
VOD with a 2" pipe	0...50 NTU	0...500 NTU
VOD with a 3" pipe	0...30 NTU	0...200 NTU
VOD with a 4" pipe	0...10 NTU	0...50 NTU

<b>Sensor process connections</b>	
<b>TN</b>	Tuchenhagen "N" type DN50

<div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> <span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span><span>10</span><span>11</span> </div> <div style="display: flex; justify-content: space-around;"> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> </div>	/	<div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> <span>1</span><span>2</span><span>3</span> </div> <div style="display: flex; justify-content: space-around;"> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> <div style="width: 40px; height: 40px; border: 1px solid black;"></div> </div>
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<b>0</b>	No material certificate
<b>MC1</b>	Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard
<b>MC2</b>	Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard
<b>MC3</b>	Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

\*\*\* Do not exceed above 8% fat content.



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