



# Multi-Safe

Disposal boxes –  
For a safe disposal!



# Safety throughout the day



From blood collection through to “Multi-Safe” disposal – easy and safe!

## From blood collection through to “Multi-Safe” disposal – easy and safe!

As a renowned manufacturer of laboratory and medical devices, we consider it our duty to supply safe disposal options for our disposable products.

As different levels of waste is generated in practices, hospitals and universities, our extensive product range lets users choose from various disposal options. A variety of choice that is reflected in the different volumes, openings and multiple variants, even through to the final closure.

We ensure that all boxes meet the TRBA 250 (German regulations) as a minimum requirement so that we can guarantee the safe handling of the disposal box. Our Multi-Safe disposal boxes naturally also fulfil international regulations, such as UN 3291 and ISO 23907. These differ from the TRBA 250 in that they usually not only define the shape or appearance but also the durability (wall thickness, fall tests from 1.20 m, etc.).

In addition, the UN certification regulates whether the disposal box can be filled with dangerous goods. A UN-certified box can be recognised by the multi-digit UN code that is usually stamped in the top of the lid.

All our Multi-Safe disposal boxes are made of polypropylene so that disposal by burning is environmentally friendly: no harmful substances are produced by combustion.



Around the world, health care workers are at constant risk of infection from needlestick injuries (NSI). This is a particular concern when disposing of sharp and pointed objects. The most common viruses are hepatitis B (HBV), hepatitis C (HCV) and HIV. An estimated 500,000 needlestick injuries occur in Germany alone, resulting in around 50 million euros in consequential costs. Medical personnel (approx. 39%) are most likely to suffer a needlestick injury, followed by nursing staff (approx. 34%).<sup>1)</sup>

These figures once again clearly show just how important it is to use high-quality disposal boxes!

To avoid incorrect applications in this area, we believe it is important to make sure that users handle Multi-Safe disposal boxes safely by providing instructions for use and internal training.

<sup>1)</sup> Deutsches Ärzteblatt [German Medical Journal] 2007, vol. 104, pp. A3102-3107

More information:



[workflow.sarstedt.com](http://workflow.sarstedt.com)





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# Multi-Safe sani & mini

## Multi-Safe for on the go - the "littlies" with the big job

- Safe needle box for on the go
- Suitable for outpatient use by doctors, nurses and rescue services or for doctor's and medical cases
- One-handed opening and closing of the day and final closure
- Lid already assembled
- Compact



You can find the certifications of the boxes in the overview on page 26.



### Ordering information

| REF         | Article description | Volume in l | Material      | Units per case | Units per pallet | Case dimensions [cm] | Pallet dimensions [cm] |
|-------------|---------------------|-------------|---------------|----------------|------------------|----------------------|------------------------|
| 77.3890.002 | Multi-Safe sani 200 | 0.2         | Polypropylene | 110            | 3,300            | 40 x 40 x 60         | 120 x 80 x 195         |



### Ordering information

| REF         | Article description | Volume in l | Material      | Units per case | Units per pallet | Case dimensions [cm] | Pallet dimensions [cm] |
|-------------|---------------------|-------------|---------------|----------------|------------------|----------------------|------------------------|
| 77.3890.003 | Multi-Safe mini 300 | 0.3         | Polypropylene | 135            | 2,700            | 31.7 x 40 x 60       | 120 x 80 x 195         |

# Multi-Safe vario



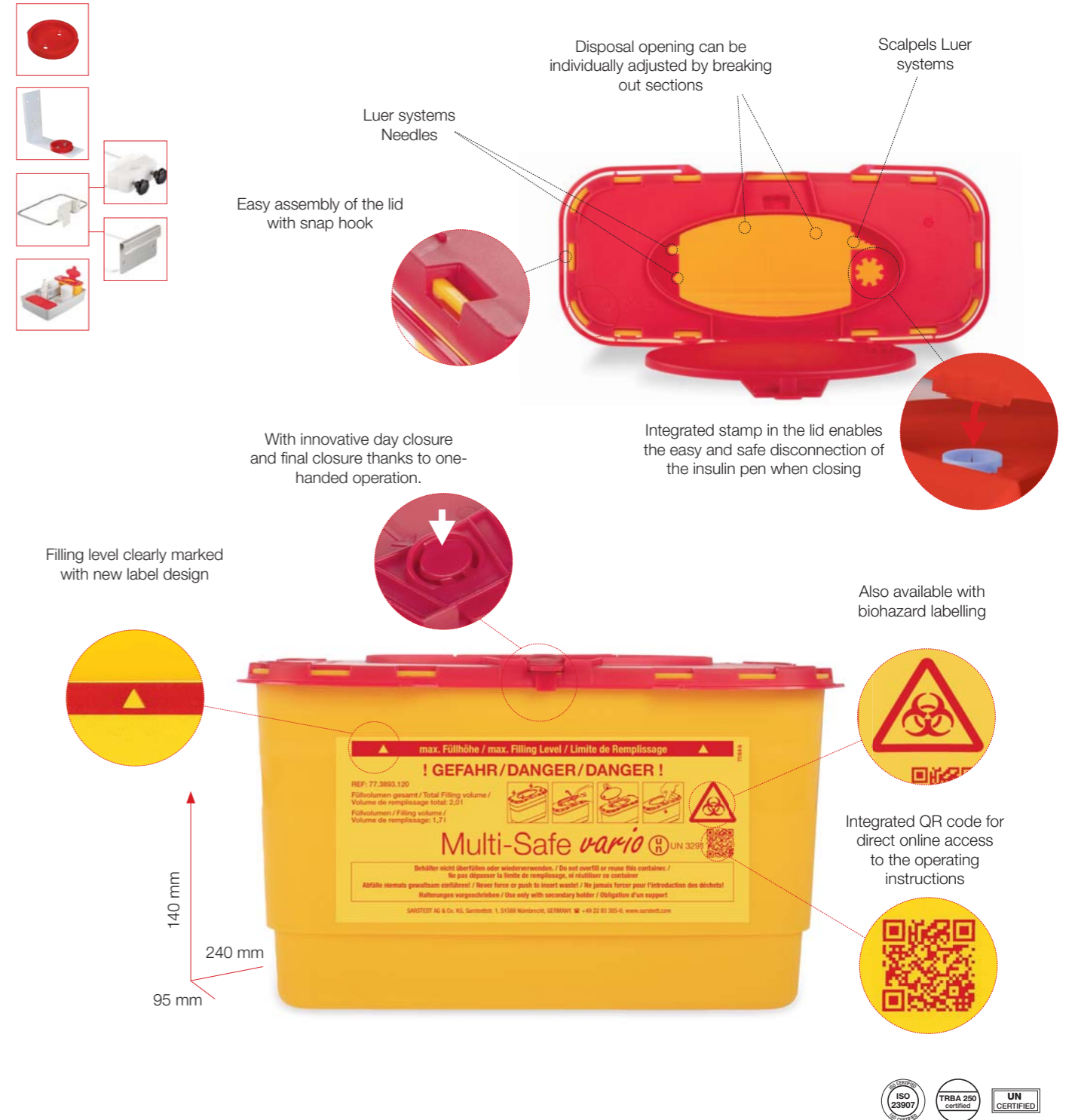
## Multi-Safe vario 2000 - large opening 2.0

- Easy assembly of the lid with snap hook
- The size of the disposal opening can be adjusted by breaking out sections as required. Please break out before use.
- Day closure and final closure enables one-handed operation
- IML label (in-mould labelling) stamped directly during production with product labelling in 9 languages
- The stamped label allows for the content of the box to be easily compared with the filling level mark
- QR code on the box enables quick and direct access to the instructions for use
- Various removal and twist-off aids for needles, Luer systems and insulin pens
- Integrated stamp in the lid enables the easy and safe disconnection of the insulin pen when closing
- Also available as version with biohazard labelling
- Compatible with commercially available trays
- Certified in line with DIN ISO 23907, UN 3291 and TRBA 250



Compatible with commercially available trays

vario accessories (see p. 24)



## Ordering information

| REF         | Description                                | Volume in l | Material | Units per case | Units per pallet | Case dimensions [cm] | Pallet dimensions [cm] |
|-------------|--|-------------|----------|----------------|------------------|----------------------|------------------------|
| 77.3893.020 | Multi-Safe vario 2000                      | 2.0 l       | PP       | 50             | 1,000            | 59.4 x 39.4 x 34.3   | 120 x 80 x 195         |
| 77.3893.120 | Multi-Safe vario 2000 with biohazard label | 2.0 l       | PP       | 50             | 1,000            | 59.4 x 39.4 x 34.3   | 120 x 80 x 195         |

You can find the certifications of the boxes in the overview on page 26.

# Multi-Safe twin plus



The innovative disposal box with added safety!

## Multi-Safe twin plus - innovative design for optimal handling and greater safety

- Optimised assembly of the lid with snap hook
- Innovative lid: the day closure and final closure enable one-handed operation
- Disposal opening can be gradually enlarged by breaking out the sections. Please break out before use.
- IML label (in-mould labelling) stamped directly during production with product labelling in 9 languages
- The stamped label allows for the content of the box to be easily compared with the filling level mark
- QR code on the box enables quick and direct access to the instructions for use
- Various removal and turning aids
- In particular, the integrated stamp for insulin pens introduces significant benefits as, by pressing down the lid, the stamp pushes the insulin pens completely into the box
- Various table and wall holders provide the option of fastening the boxes in different areas and prevent toppling (see accessories p. 24)
- Also available as version with biohazard labelling
- Certified in line with DIN ISO 23907, UN 3291 and TRBA 250

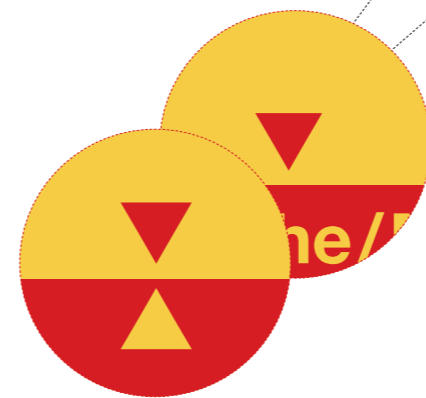
twin plus accessories (see p. 24)



With innovative day closure and final closure with one-handed operation and "Press for final closure" imprint



Directly integrated label in 9 languages – label also available as customised solution



Filling level clearly marked with new label design



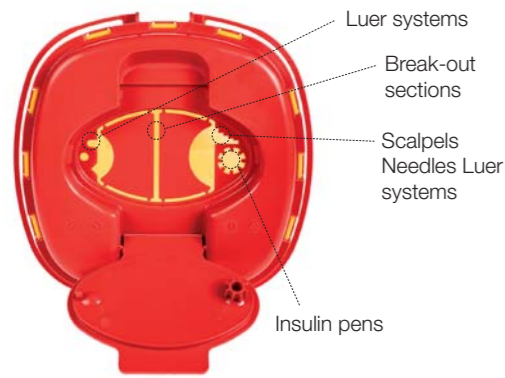
Also available with biohazard labelling



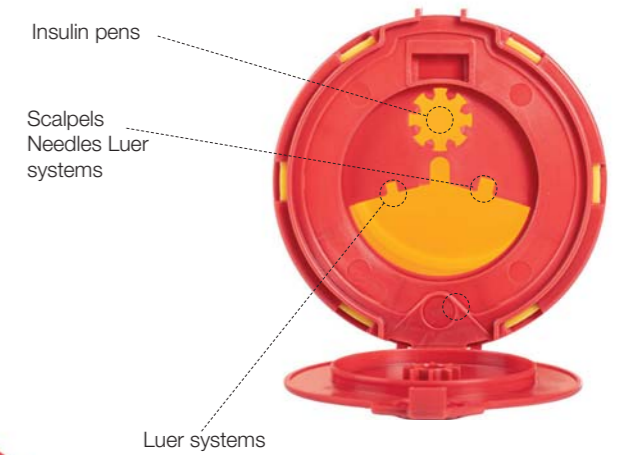
Integrated QR code for direct online access to the operating instructions



You can find the certifications of the boxes in the overview on page 26.



twin plus accessories (see p. 24)



Ordering information

| REF         | REF biohazard | Multi-Safe twin plus | Volume in l | Material      | Units per case | Units per pallet | Case dimensions [cm] | Pallet dimensions [cm] |
|-------------|---------------|----------------------|-------------|---------------|----------------|------------------|----------------------|------------------------|
| 77.3884.005 | 77.3884.105   | 500                  | 0.5         | Polypropylene | 126            | 3,024            | 59 x 27 x 45         | 120 x 80 x 195         |
| 77.3884.015 | 77.3884.115   | 1500                 | 1.5         | Polypropylene | 94             | 1,128            | 80 x 40 x 38         | 120 x 80 x 195         |
| 77.3884.020 | 77.3884.120   | 2000                 | 2.0         | Polypropylene | 80             | 960              | 80 x 40 x 38         | 120 x 80 x 195         |
| 77.3884.025 | 77.3884.125   | 2500                 | 2.5         | Polypropylene | 70             | 840              | 80 x 40 x 38         | 120 x 80 x 195         |
| 77.3884.030 | 77.3884.130   | 3000                 | 3.0         | Polypropylene | 62             | 744              | 80 x 40 x 38         | 120 x 80 x 195         |
| 77.3884.050 | 77.3884.150   | 5000                 | 5.0         | Polypropylene | 34             | 408              | 80 x 40 x 38         | 120 x 80 x 195         |

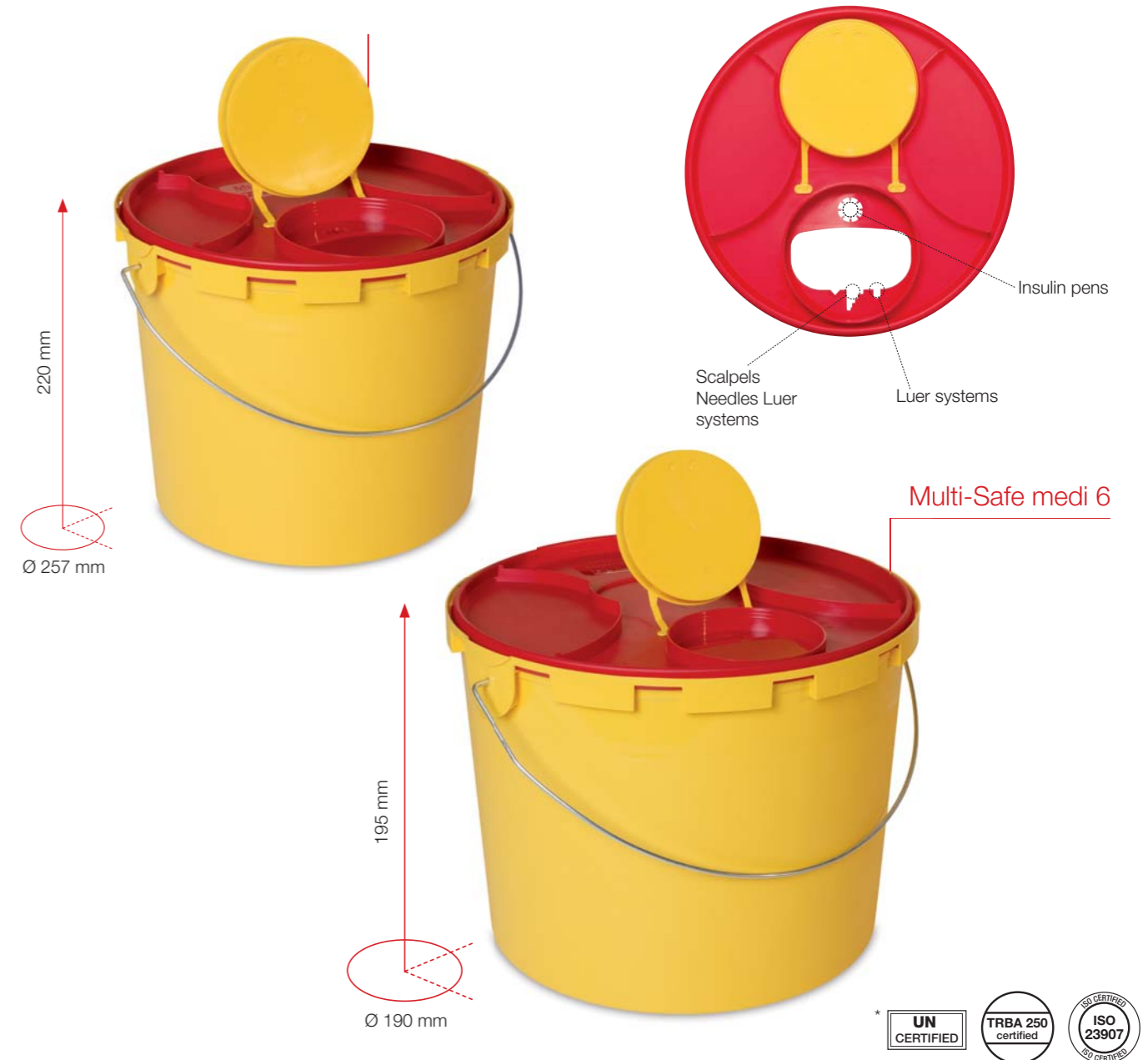




# Multi-Safe medi

## Large-volume box with handle and label

- Round container shape
- No additional holders needed thanks to the large circular footprint
- Various designs (with or without handle, additional label)
- Closures have been developed so that they automatically fall backwards on opening and uncover the disposal opening
- Side grooves at the top edge visually confirm the closure of the container
- Various removal and turning aids



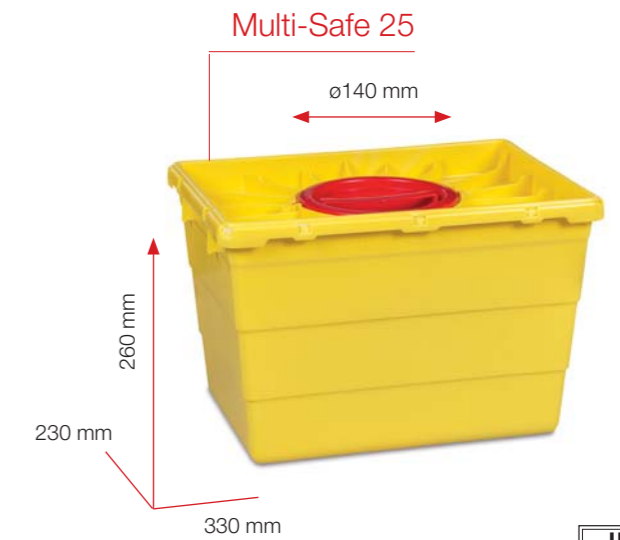
## Ordering information

| REF         | Article description                     | Volume in l | Material      | Units per case | Units per pallet | Case dimensions [cm] | Pallet dimensions [cm] |
|-------------|---|-------------|---------------|----------------|------------------|----------------------|------------------------|
| 77.3898.011 | Multi-Safe medi 11                      | 11.0        | Polypropylene | -              | 250              | -                    | 120 x 80 x 195         |
| 77.3898.511 |   |             |               | 10             | 160              | 40 x 40 x 60         | 120 x 80 x 195         |
| 77.3898.111 | Multi-Safe medi 11 with handle          | 11.0        | Polypropylene | -              | 250              | -                    | 120 x 80 x 195         |
| 77.3898.006 | Multi-Safe medi 6                       | 6.0         | Polypropylene | -              | 480              | -                    | 120 x 80 x 195         |
| 77.3898.506 |   |             |               | 21             | 336              | 40 x 40 x 60         | 120 x 80 x 195         |
| 77.3898.106 | Multi-Safe medi 6 with handle           | 6.0         | Polypropylene | -              | 480              | -                    | 120 x 80 x 195         |
| 77.3898.206 | Multi-Safe medi 6 with handle and label | 6.0         | Polypropylene | 21             | 336              | 40 x 40 x 60         | 120 x 80 x 195         |

\*UN testing only medi 6, medi 6 with handle, medi 6 with handle and label

You can find the certifications of the boxes in the overview on page 26.

# Multi-Safe *eco*



## A safe and stable container for the disposal of clinical waste

- Rectangular container shape
- No additional holders needed thanks to the large footprint
- Various designs
- Multi-Safe 25 & 50 - lid-in-lid system provides variable disposal opening
- Liquid-tight final closure thanks to the adhesive strip fastened on the side of the lid
- Side grooves at the edge visually confirm the closure of the container
- Can be stacked empty and full
- Suitable for oncological waste, cytostatic drugs
- Collection and transport container for small disposal boxes

You can find the certifications of the boxes in the overview on page 26.

## Ordering information

| REF         | Article description | Volume in l | Material      | Units per case | Units per pallet | Case dimensions [cm] | Pallet dimensions [cm] |
|-------------|---------------------|-------------|---------------|----------------|------------------|----------------------|------------------------|
| 77.3899.050 | Multi-Safe eco 50   | 50.0        | Polypropylene | -              | 125              | -                    | 120 x 80 x 195         |
| 77.3899.025 | Multi-Safe eco 25   | 25.0        | Polypropylene | -              | 160              | -                    | 120 x 80 x 195         |
| 77.3899.150 | Multi-Safe 50       | 50.0        | Polypropylene | -              | 125              | -                    | 120 x 80 x 195         |
| 77.3899.125 | Multi-Safe 25       | 25.0        | Polypropylene | -              | 160              | -                    | 120 x 80 x 195         |



# Multi-Safe *steri*

## Multi-Safe steri - huge, practical, (autoclave-)safe

- Rectangular container
- No additional holders needed thanks to the large footprint
- Safe and stable for the disposal of infectious waste
- Autoclave-safe at 121°C to 134°C
- Small lid melts at around 90°C and releases the autoclave process through a grid
- The small lids can be purchased to label boxes that have already been autoclaved (77.3888.800 - yellow; other colours are possible)
- Easy to transport with handles in the bottom and top part
- Side grooves on the lid visually confirm the closure
- Can be stacked empty and full
- Collection and transport container for small disposal boxes



### Ordering information

| REF         | Article description | Volume in l | Material      | Units per case | Units per pallet | Case dimensions [cm] | Pallet dimensions [cm] |
|-------------|---------------------|-------------|---------------|----------------|------------------|----------------------|------------------------|
| 77.3899.060 | Multi-Safe steri 60 | 60.0        | Polypropylene | -              | 120              | -                    | 120 x 80 x 240         |
| 77.3899.035 | Multi-Safe steri 35 | 35.0        | Polypropylene | -              | 150              | -                    | 120 x 80 x 240         |

You can find the certifications of the boxes in the overview on page 26.

## Custom products



### Customised Multi-Safe disposal box

- From a minimum number of units, Multi-Safe disposal boxes can be ordered as custom products (e.g. different colour, personalised labels, etc.)
- Additional certification with your company address exclusively for your Multi-Safe disposal box can also be requested.
- Multi-Safe and Multi-Safe eco are not available in special colours.
- For questions concerning your customised Multi-Safe disposal box, your personal SARSTEDT contact or our hotline will be happy to help.

- Tailored to the requirements of blood collection, you can put the Safety Tray together in various flexible versions.
- Warning: The accessories illustrated are not part of the standard delivery and must be ordered separately.

| REF         | Design  |  | Units per case |
|-------------|---|--|----------------|
| 93.1650     | Safety tray without insertion plate<br>429 x 283 x 80 mm  |  | 1/box          |
| 93.1650.010 | Version I<br>1 x S-Monovette® block rack D17 with handle<br>2 x dispenser box with lid<br>1 x Multi-Safe twin plus 500<br>3 x multi-purpose cup<br>1 x disinfection spray |  | 1/box          |
| 93.1650.020 | Version II<br>2 x dispenser box with lid<br>1 x Multi-Safe vario 2000<br>6 x multi-purpose cup<br>1 x disinfection spray  |  | 1/box          |
| 93.1650.030 | Version III<br>2 x dispenser box with lid<br>1 x Multi-Safe twin plus 500<br>8 x multi-purpose cup<br>1 x disinfection spray  |  | 1/box          |
| 93.1650.040 | Version IV<br>1 x S-Monovette® block rack D17 with handle<br>2 x dispenser box with lid<br>1 x Multi-Safe vario 2000<br>1 x multi-purpose cup<br>1 x disinfection spray   |  | 1/box          |
| 93.1650.050 | Version V<br>1 x S-Monovette® rack D17 with handle<br>1 x dispenser box with lid<br>1 x Multi-Safe Box twin plus 2000<br>3 x multi-purpose cup<br>1 x disinfection spray  |  | 1/box          |

### Accessories

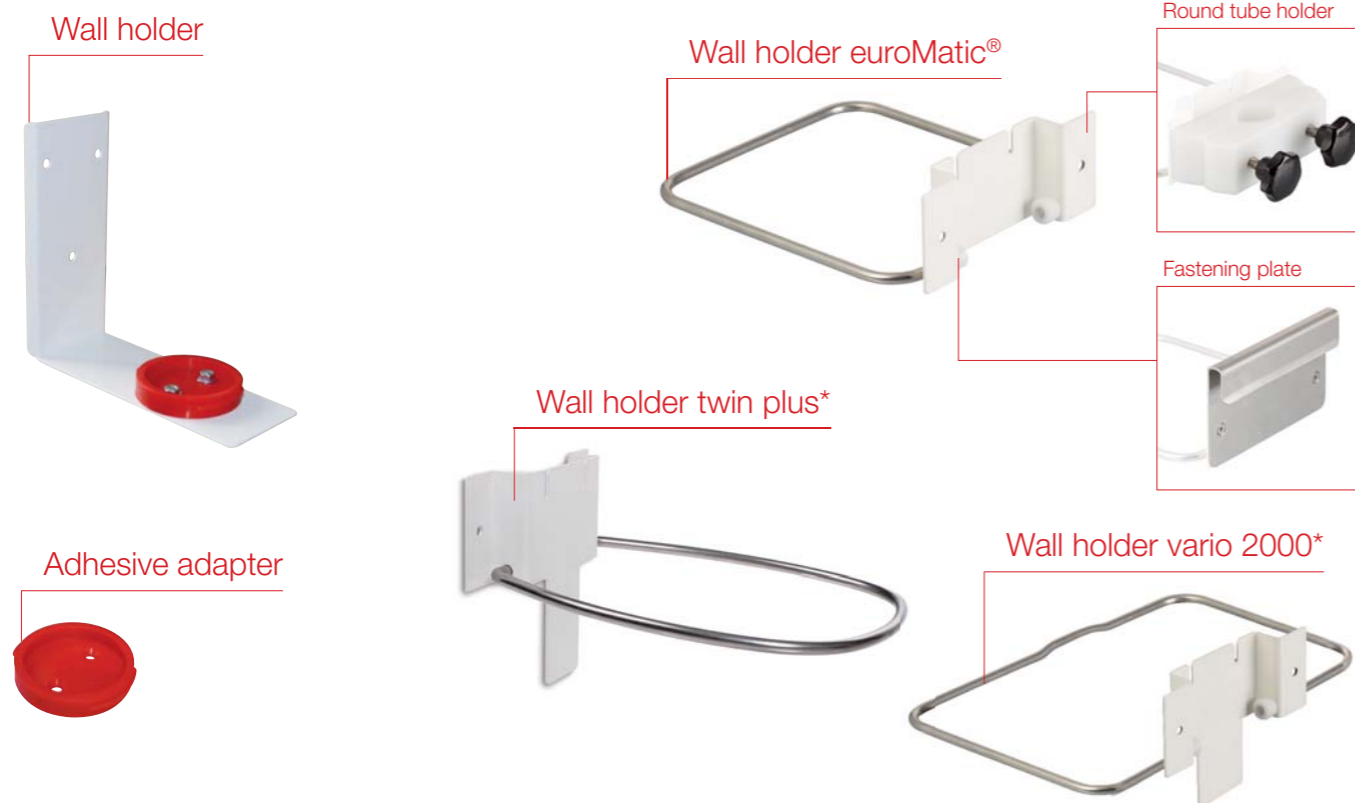
| REF                        | Article description       | Design                                | Units per case |
|----------------------------|---------------------------|---------------------------------------|----------------|
| 77.3884.005<br>77.3884.105 | Multi-Safe twin plus 500  | 0.5 l suitable for versions I and III | 126/box        |
| 77.3893.020<br>77.3893.120 | Multi-Safe vario 2000     | 2.0 l suitable for versions II and IV | 50/box         |
| 77.3884.020<br>77.3884.120 | Multi-Safe twin plus 2000 | 2.0 l suitable for version V          | 50/box         |
| 95.813.001                 | Dispenser box             | With lid for Safety Tray              | 35/box         |
| 75.1355                    | Multi-purpose cup         | 125 ml for Safety Tray                | 1,000/box      |
| 93.851                     | Block D17                 | With handle, grey                     | 12/box         |
| 93.851.171                 | Block D17                 | With handle, red                      |                |
| 93.851.172                 | Block D17                 | With handle, yellow                   |                |
| 93.851.173                 | Block D17                 | With handle, green                    |                |
| 93.851.174                 | Block D17                 | With handle, blue                     |                |
| 93.851.175                 | Block D17                 | With handle, orange                   |                |

## Safety tray



# ACCESSORIES

For easy and safe assembly of the Multi-Safe safety containers on the wall, table or smooth surfaces



## Ordering information

| REF        | Article description               | Material        | Units per case | Suitable for series          |
|------------|-----------------------------------|-----------------|----------------|------------------------------|
| 95.965.001 | Adhesive adapter                  | Polypropylene   | 150            | twin plus, euroMatic®        |
| 95.963     | Wall holder with adhesive adapter | stainless steel | 30             | twin plus, euroMatic®        |
| 95.963.001 | Wall holder/euroMatic®            | stainless steel | 20             | euroMatic®                   |
| 95.963.006 | Round tube holder                 | POM             | 10             | twin plus, euroMatic®, vario |
| 95.963.005 | Fastening plate                   | stainless steel | 20             | twin plus, euroMatic®, vario |
| 95.963.007 | Wall holder twin plus             | stainless steel | 20             | twin plus                    |
| 95.963.020 | Wall holder vario 2000            | stainless steel | 5              | vario                        |

\* Round tube holder and fastening plate are also suitable for the twin plus and vario wall holders

## Absorbent materials (ISO 23907)

ISO 23907 requires the following absorbent materials to be placed in the disposal box to prevent the leakage of liquid residue (does not apply for twin plus series). It is important to ensure that adequate absorbent material is used to cover the entire fill volume of a box.



## Ordering information

| REF     | Absorption        | Minimum order volume | for Multi-Safe                        |
|---------|-------------------|----------------------|---------------------------------------|
| 78.669  | 16 ml per unit    | 1,000                | euroMatic®                            |
| 78.684  | 8 ml per unit     | 2,000                | sani, mini                            |
| 95.1712 | 1,200 ml per unit | 100                  | euroMatic® (6.0 and 7.0 litres), medi |

Accessories information



www.sarstedt.com/  
produkte/diagnostik/  
multi-safe/zubehoer/

## Multi-Safe label

In addition to the disposal boxes, the following label can be ordered:



## Ordering information

| REF         | Article description | Units per inner box | Units per outer box |
|-------------|---------------------|---------------------|---------------------|
| 84.1390.022 | Label 70 x 80 mm    | 2,000               | 8.000               |

# OVERVIEW



| Box type                         | REF         | REF with biohazard | Tests    |    |           |
|----------------------------------|-------------|--------------------|----------|----|-----------|
|                                  |             |                    | TRBA 250 | UN | ISO 23907 |
| Multi-Safe sani 200              | 77.3890.002 |                    | ✓        | ✓  | ✓         |
| Multi-Safe mini 300              | 77.3890.003 |                    | ✓        | ✓  | ✓         |
| Multi-Safe vario 2000            | 77.3893.020 | 77.3893.120        | ✓        | ✓  | ✓         |
| Multi-Safe twin plus 500         | 77.3884.005 | 77.3884.105        | ✓        | ✓  | ✓         |
| Multi-Safe twin plus 1500        | 77.3884.015 | 77.3884.115        | ✓        | ✓  | ✓         |
| Multi-Safe twin plus 2000        | 77.3884.020 | 77.3884.120        | ✓        | ✓  | ✓         |
| Multi-Safe twin plus 2500        | 77.3884.025 | 77.3884.125        | ✓        | ✓  | ✓         |
| Multi-Safe twin plus 3000        | 77.3884.030 | 77.3884.130        | ✓        | ✓  | ✓         |
| Multi-Safe twin plus 5000        | 77.3884.050 | 77.3884.150        | ✓        | ✓  | ✓         |
| Multi-Safe euroMatic® 3000       | 77.3897.030 | 77.3897.230        | ✓        | ✓  | ✓         |
| Multi-Safe euroMatic® 4000       | 77.3897.040 | 77.3897.240        | ✓        | ✓  | ✓         |
| Multi-Safe euroMatic® 6000       | 77.3897.060 | 77.3897.260        | ✓        | ✓  | ✓         |
| Multi-Safe euroMatic® 7000       | 77.3897.070 | 77.3897.270        | ✓        | ✓  | ✓         |
| Multi-Safe medi 6                | 77.3898.006 |                    | ✓        | ✓  | ✓         |
| Multi-Safe medi 11               | 77.3898.011 |                    | ✓        | -  | ✓         |
| Multi-Safe medi 6                | 77.3898.506 |                    | ✓        | ✓  | ✓         |
| Multi-Safe medi 6 with handle    | 77.3898.106 |                    | ✓        | ✓  | ✓         |
| Multi-Safe medi 11 with handle   | 77.3898.111 |                    | ✓        | -  | ✓         |
| Multi-Safe medi 6, handle, label | 77.3898.206 |                    | ✓        | ✓  | ✓         |
| Multi-Safe medi 11               | 77.3898.511 |                    | ✓        | -  | ✓         |
| Multi-Safe eco 25                | 77.3899.025 |                    | -        | ✓  | -         |
| Multi-Safe eco 50                | 77.3899.050 |                    | -        | ✓  | -         |
| Multi-Safe steri 35              | 77.3899.035 |                    | -        | ✓  | -         |
| Multi-Safe steri 60              | 77.3899.060 |                    | -        | ✓  | -         |
| Multi-Safe 25                    | 77.3899.125 |                    | -        | ✓  | -         |
| Multi-Safe 50                    | 77.3899.150 |                    | -        | ✓  | -         |

| Volume in l | Height [mm] | Ø lid [mm] | Ø base [mm] | Units per case | Units per pallet |
|-------------|-------------|------------|-------------|----------------|------------------|
| 0.2         | 131         | 75 x 47    | 57 x 32     | 110            | 3,300            |
| 0.3         | 160         | 98         | 41 x 77     | 135            | 2,700            |
| 2.0         | 140         | 243 x 102  | 95 x 240    | 50             | 1,000            |
| 0.5         | 162         | 89         | 57          | 126            | 3,024            |
| 1.5         | 125         | 179 x 176  | 112         | 94             | 1,128            |
| 2.0         | 162         | 179 x 176  | 112         | 80             | 960              |
| 2.5         | 197         | 179 x 176  | 112         | 70             | 840              |
| 3.0         | 233         | 179 x 176  | 112         | 62             | 744              |
| 5.0         | 379         | 179 x 176  | 112         | 34             | 408              |
| 3.0         | 185         | 166 x 43   | 132 x 132   | 55             | 495              |
| 4.0         | 245         | 166 x 43   | 132 x 132   | 50             | 450              |
| 6.0         | 330         | 166 x 43   | 132 x 132   | 40             | 360              |
| 7.0         | 390         | 166 x 43   | 132 x 132   | 34             | 306              |
| 6.0         | 195         | 230        | 190         | -              | 480              |
| 11.0        | 220         | 290        | 257         | -              | 250              |
| 6.0         | 195         | 230        | 190         | 21             | 336              |
| 6.0         | 195         | 230        | 190         | -              | 480              |
| 11.0        | 220         | 290        | 257         | -              | 250              |
| 6.0         | 195         | 230        | 190         | 21             | 336              |
| 11.0        | 220         | 290        | 257         | 10             | 160              |
| 25.0        | 260         | 295 x 395  | 230 x 330   | -              | 160              |
| 50.0        | 500         | 295 x 395  | 230 x 330   | -              | 125              |
| 35.0        | 330         | 393 x 393  | 340 x 340   | -              | 150              |
| 60.0        | 520         | 393 x 393  | 340 x 340   | -              | 120              |
| 25.0        | 260         | 295 x 395  | 230 x 330   | -              | 160              |
| 50.0        | 500         | 295 x 395  | 230 x 330   | -              | 125              |

# HANDLING

## Safe handling of disposal boxes *euroMatic®*, *steri*, *eco*, *twin plus*

Position the lid centred on the bottom part of the box. The red day lid and handle face forwards.

Simultaneously push on the opposite corners of the lid to connect it with the bottom part.

The edge of the lid must be firmly inserted around the entire circumference, until it audibly and visibly (see detail circle) locks into place.



## Safe handling of disposal boxes *medi*

Position the lid centred on the bottom part of the box. The yellow day lid faces forwards.

Simultaneously push on the opposite sides of the lid to join it with the bottom part.

The edge of the lid must be firmly inserted around the entire circumference, until it audibly and visibly locks into place.



## Safe handling of disposal boxes *eco* / *Multi-Safe* (Lid-in-lid)

Position the lid centred on the bottom part of the box.

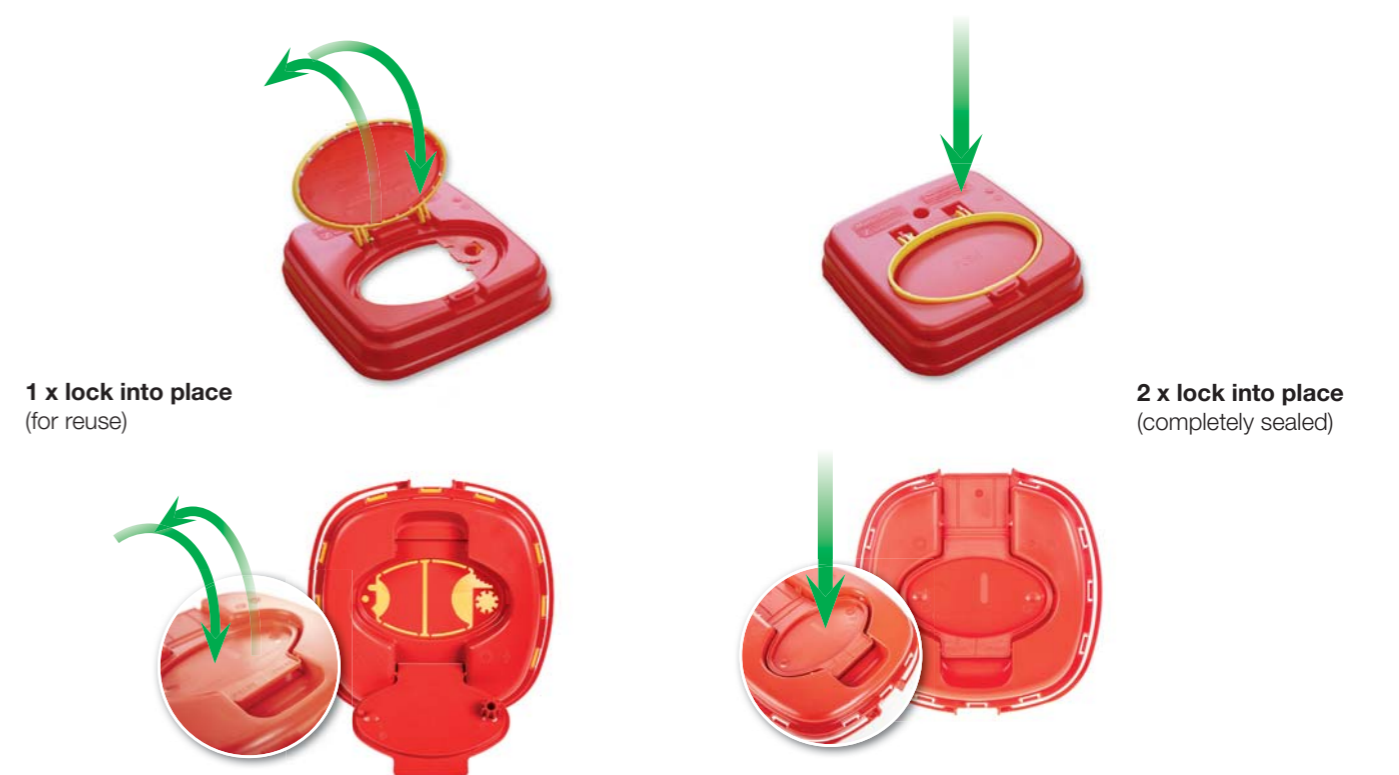
Simultaneously push on the opposite sides of the lid to join it with the bottom part.

The edge of the lid must be firmly inserted around the entire circumference, until it audibly and visibly locks into place.



### Day closure

### Final closure



# Multi-Safe instructions for use

## Intended use

The disposal container is exclusively intended to dispose of pointed and sharp objects, such as needles and scalpel blades from the medical field.

## Safety advice

- Only use containers of a size that is suitable for holding the items to be disposed of.
- Store the box out of the reach of children.
- The lid must be on the container and locked into place before it is filled.
- Connect containers with the recommended adhesive adapter by rotating or hanging in the wall holder to prevent accidents.
- Do not use the day lid to press down the items to be disposed of.
- Scalpels must be disposed of in the container with particular care. If too much force is used when throwing scalpels in or if other items are placed on top, there is a risk of the angle changing and damaging the container walls or the base of the container.
- Only place items to be disposed of upright in the container.
- Do not press items into the container with force.
- Do not place any liquids in the container.
- Do not fill the box over the fill line (risk of injury).
- Do not place hands or any other objects in the container (risk of injury).
- Do not throw the box. Do not shake the box. Do not drop the box.
- Before sealing the container, ensure that no items are projecting through the opening.
- Close the box by hand, without applying too much force.
- Do not push the box against your body (e.g. chest) for the final closure.
- Do not compress a full box.
- Use the handle.
- Before disposing of the container, carefully check that the lid is tightly sealed.



## ISO 23907

One of the absorbent liners from page 25 must be used to ensure the compliant use of the box.

## Disposal and the environment

- Plastics used in our products are environmentally neutral in terms of disposal.
- The plastic can be sent to landfill, as they do not release any harmful substances into the air, earth or water.
- When disposed of in incinerators, the plastics PS, PP, PC and PE serve as valuable sources of energy to maintain the temperature in the combustion chamber - the more plastic in the waste, the less heating oil is used. Burning these plastics does not release any hazardous emissions.

|  | <b>Polystyrene</b>   | <b>Polypropylene</b>  | <b>Polycarbonate</b>  | <b>Polyethylene</b>  |
|--|--|---|---|--|
| <b>Abbreviation</b>                        | <b>PS</b>  | <b>PP</b>   | <b>PC</b>   | <b>HD-PE High Density<br/>LD-PE Low Density</b>  |
| <b>Optical properties</b>                  | transparent, shiny surface with 90% light transmission (at 400-800 nm)   | translucent, shiny surface  | transparent, 88% light transmission (at 400-800 nm)   | translucent to opaque, waxy surface  |
| <b>General mechanical properties</b>       | Low elongation at break and thermal resistance, very good electrical insulating properties, not suitable for high centrifugal accelerations  | high breaking strength, resistant to stress cracking, stable form and high rigidity   | very good mechanical, optical, electrical and thermal properties, can be autoclaved and sterilised  | Relatively low tensile strength and surface hardness, high toughness, soft to firm, sensitive to stress cracking, water-repellent  |
| <b>Autoclavability</b>                     | Not suitable   | Products made of PP can be autoclaved up to 121°C without any appreciable loss of mechanical properties. The user must check whether other product characteristics are affected in terms of the desired use.  | Products made of PC can be autoclaved up to 121°C without any appreciable loss of mechanical properties. The user must check whether other product characteristics are affected in terms of the desired use.  | Not suitable   |
| <b>Max. Continuous use temperature*1</b>   | 60 - 70°C  | 100 - 110°C   | 115 - 125°C   | HD-PE 70 - 80°C<br>LD-PE 60 - 75°C   |
| <b>Temporary maximum use temperature*1</b> | 75 - 80°C  | 120 - 140°C   | 125 - 140°C   | HD-PE 90 - 120 °C<br>LD-PE 80 - 90 °C  |
| <b>Use at sub-zero temperatures*2</b>      | Not well-suited  | Limited suitability*1   | down to -80°C   | Limited suitability*1  |
| <b>Thickness g/cm<sup>3</sup></b>          | 1.05   | 0.90  | 1.19  | HD-PE 0.95<br>LD-PE 0.92   |
| <b>Flammability</b>                        | Flammable  | Flammable   | Flammable   | Flammable  |
| <b>Ignition temperature*1</b>              | 300 - 400°C  | 300 - 360°C   | 380 - 450°C   | 350 - 360°C  |
| <b>Moisture absorption</b>                 | < 0.1%   | < 0.1%  | 0.1 - 0.3%  | < 0.1%   |
| <b>General resistance to chemicals</b>     | PS is resistant to saline solutions, bases, non-oxidising acids, alkalis and alcohols. Benzene, volatile oils, strongly oxidising agents and flavourings attack PS, forming stress cracks. | PP is resistant to aqueous solutions of inorganic salts, acids, alkalis and to organic solvents up to 60°C. Alcohols, esters and ketones also do not attack PP. Aromatic and halogenated hydrocarbons, oxidising substances such as concentrated nitric acid and fats, oils and waxes at high temperatures cause PP to swell. | PC is resistant to higher concentrations of mineral acids, many organic acids (e.g. carbonic acid, oleic acid and citric acid), oxidants, reducing agents, neutral and acidic saline solutions, a range of fats and oils, saturated, aliphatic and cycloaliphatic hydrocarbons and alcohols (except methanol). Bases, ammonia gas and its soluble form, and amines attack PC. PC is soluble in a range of industrial solvents. Other organic compounds like benzene, acetone and carbon tetrachloride eventually lead to expansion or swelling. | PE has a high resistance to chemicals. The chemical resistance of HD-PE is generally higher than that of LD-PE. Diluted acids, alkalis, alcohol, oil and water and saline solutions do not affect PE. Concentrated, oxidising acids, such as nitric acid and halogens have a corrosive effect. |
| <b>Disposal</b>                            | PS is a pure hydrocarbon and thus environmentally neutral in terms of disposal. The controlled burning of this plastic does not release any hazardous emissions.                           | PP is a pure hydrocarbon and thus environmentally neutral in terms of disposal. The controlled burning of this plastic does not release any hazardous emissions.  | PC is a pure hydrocarbon and thus environmentally neutral in terms of disposal. The controlled burning of this plastic does not release any hazardous emissions.  | PE is a pure hydrocarbon and thus environmentally neutral in terms of disposal. The controlled burning of this plastic does not release any hazardous emissions.   |

\*1 Suitability depends on the type of plastic used and the type of stress.

\*2 Warning: The plastic becomes brittle at sub-zero temperatures. The use of products at sub-zero temperatures should be tested in advance for the relevant application. This information should serve as a guide and does not guarantee product properties.



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