Product information

The new **LTS-D**

The 2nd generation supraglottic airway device –
ideal for clinical use and pre-hospital environment

A success story

> "Nothing is more fundamental to the practice of general anesthesia than the maintenance of a clear upper airway."
>
> Hagberg, C.: Benumof and Hagberg's Airway Management, 3rd edition, 2013, page 467

In 1999 the Laryngeal Tube was introduced as a new supraglottic airway device for airway management in emergency medicine.

The Laryngeal Tube is used as an alternative for mask ventilation or as a non-invasive and atraumatic device for airway management in case of failed or unnecessary endotracheal intubation.

The unique design of the Laryngeal Tube allows a fast and blind insertion: the tip of the tube is automatically positioned at the entry of the oesophagus. After the placement in the hypopharynx both cuffs are inflated to seal oesophagus and pharynx. Thus, the ventilation through the trachea is ensured and pulmonary tidal volumes can be achieved. Sealing the oesophagus reduces the risk of aspiration and gastric insufflation. Furthermore, the Laryngeal Tube allows uninterrupted cardiac compressions during CPR (cardiopulmonary resuscitation) because of its high airway leak pressure.

During the years after its introduction, the Laryngeal Tube is used in routine cases as well as in the pre-hospital environment. It gradually gains worldwide popularity.

LT LTSII LT-D LTS-D

In 2002 follows the introduction of a new version, the Laryngeal Tube suction II. The LTS II has an additional lumen to release gastric pressure and to increase protection against aspiration: The passive pressure relief avoids gastric insufflation, especially in case of regurgitation it allows suction of gases and fluids. This is a major advantage, particularly in pre-hospital situations with non-fasted patients.

In 2003 a disposable version called the LT-D (Laryngeal Tube Disposable) was introduced. Two years later, in 2005, the LTS-D is introduced. A single use version of the LTS II eliminating the risk of cross-contaminations.

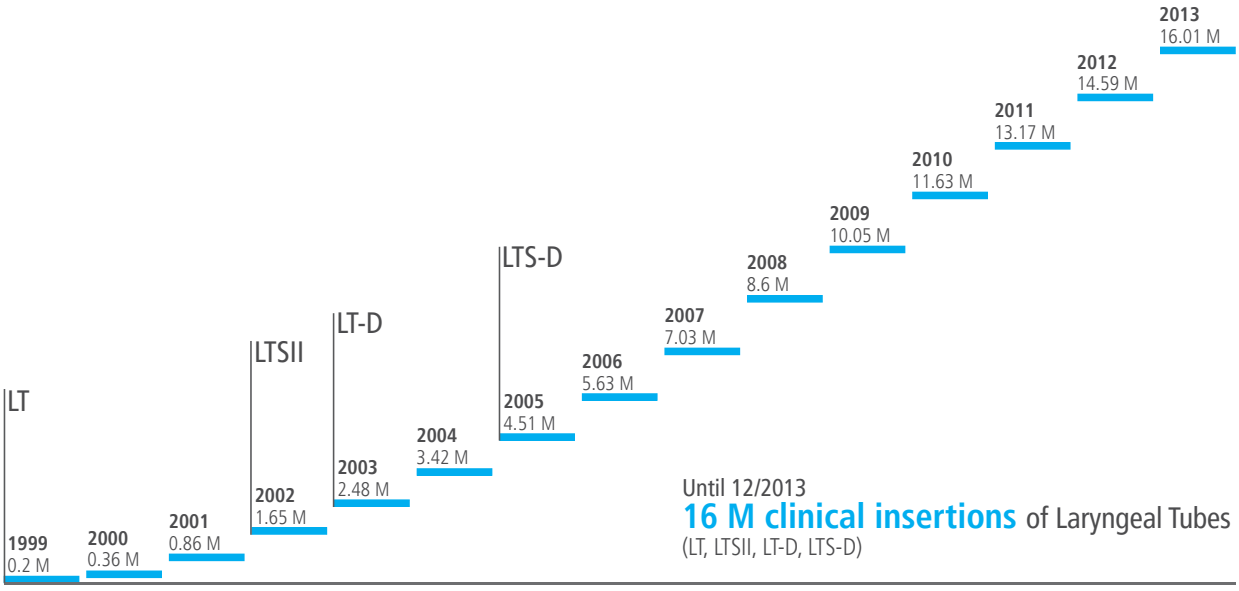
All versions of the Laryngeal Tube can also be used in the pre-hospital environment, in situations with limited space and in very difficult patient positions. Not only experienced anaesthetists or emergency physicians, but unexperienced personnel get quickly familiar with the system.

The products increasingly gain importance, especially in the pre-hospital environment and become part of international guidelines such as the ERC, AHA and ASA. Clinical studies stand for the functionality of the Laryngeal Tube which became indispensable in several countries like Germany, Japan or the USA.

"In the meantime the laryngeal tube has become an important part of the prehospital environment."

Genzwürker, H. / Hinkelbein, J. / Braunecker, S.: Notfalltechniken Larynx-Tubus, Notfallmedizin up2date 7, 2012, page 260

An intuitive, simple insertion with a higher airway leak pressure are the major advantages of the Laryngeal Tube. This leads to more than 16 million clinical insertions of the Laryngeal Tubes in 97 countries worldwide.



2nd generation supraglottic airway device

Although the Laryngeal Tube family is well established, our products are continuously developed and clinically adjusted to ensure best possible patient comfort.

This is the reason we have developed the new LTS-D: The redesigned LTS-D replaces the previous version.

" […] It is recommended that all hospitals have second generation SADs* available for both routine use and rescue airway management."

Cook, T. / Woodall, N. / Frerk, C: 4th National Audit Project oft he Royal College of Anesthetists and the Difficult Airway Society (NAP4), Major Complications of Airway Management in the United Kingdom, March 2011
Chapter 11, page 95

"EGA* with a drainage channel should be applied and a gastric tube placed."

Timmermann, A. et al: Handlungsempfehlung für das präklinische Atemwegsmanagement, DGAInfo, Anästh Intensivmed 2012; 53, page 295

*Editor's note: Extraglottic airway devices (EGA) are considered to be equivalent to supraglottic airway devices (SAD)

The new version of the LTS-D is a 2nd generation supraglottic airway device. It incorporates a ventilation tube as well as a drain tube and therefore still complies with international guidelines.

The functionality of the product remains unchanged – with improved features. The modifications are based on clinical studies and users´ feedback.

Complete range

new LTS-D

The LTS-D family is now complete!

Whilst the previous LTS-D was only available in the adult sizes 3, 4 and 5, the new version will be produced in all sizes, from newborn to adult.

Clearer connector colours avoid confusion.


previous LTS-D


new LTS-D

Easier insertion

previous LTS-D

new LTS-D

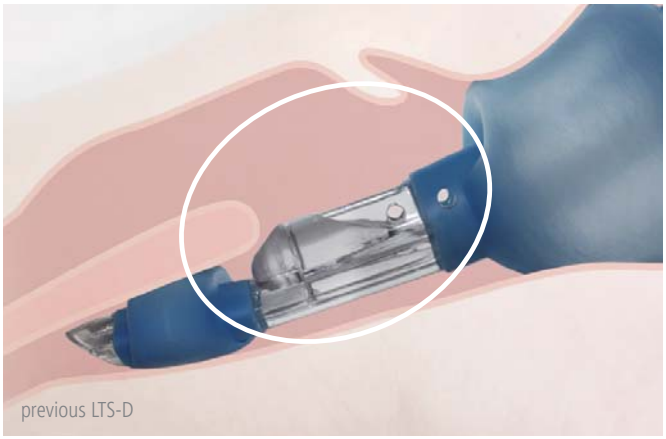
The previous LTS-D has a curvature of 45°. Due to clinical observations, the new version is manufactured with a new curvature of 60° to better adjust to the anatomy in the pharynx.
Furthermore it is made from softer material.

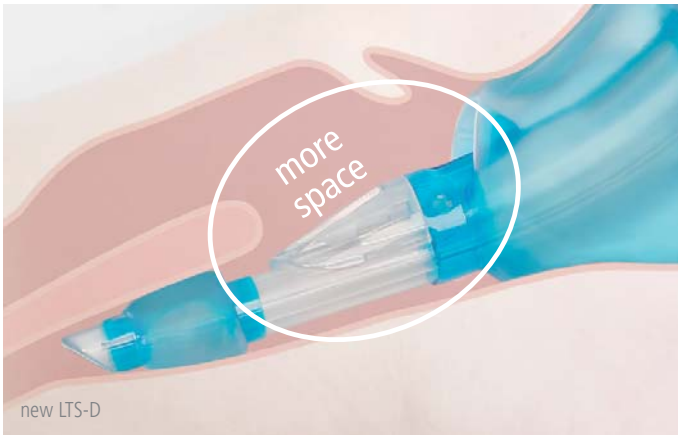
Thinner cuffs as well as a conical ramp make the tube slimmer to facilitate insertion.

The modifications to curvature, material, cuffs and ventilation section make the product even more patient friendly: while maintaining stability an easier insertion is guaranteed.

More space in the Hypopharynx

The new design of the ventilation section between the two cuffs offers a significant advantage to the previous LTS-D:
The ramp is conically shaped and increases space by app. 25% in the hypopharynx. This reduces pressure during tube insertion and placement. Thus, improving the use in difficult airways due to perfectly adjusting to the anatomy in the pharynx.


previous LTS-D



new LTS-D

Extremely thin walled low pressure cuffs

The low pressure cuffs have been modified to guarantee the optimal leak pressure and simultaneously reduce mucosal pressure.

The cuff walls of the new LTS-D are 2x thinner than before but still extremely strong. The deflated cuffs avoid bulk and with a thinner distal tip, the risk of cuff damage by the teeth is reduced.

Compared to the previous cuffs, a lower cuff pressure is automatically achieved by using the same cuff inflation volume.

Overall, it allows a low cuff pressure (< 60 cmH_2O) with a maximum seal in the hypopharynx and low pressure to the mucosa.

We recommend measuring the cuff pressure using a cuff pressure gauge. To avoid mucosal ischemia a cuff pressure of 60 cmH_2O should not be exceeded.


previous LTS-D


new LTS-D

Control of the adjusted cuff pressure

"In order to prevent tongue swelling, after initial prehospital or in-hospital placement of laryngeal tube and cuff inflation, it is important to adjust and monitor the cuff pressure."

Bernhard, M. et al: Prehospital airway management using the laryngeal tube, Der Anaesthesist 63.7 (2014), page 595

The colour coding system of both the connector and syringe remain the same. The recommended cuff inflation volume for the respective size is indicated by the respective colour on the syringe. The anatomy of every patient is different – thus a best seal is achieved by different cuff inflation volumes. To avoid mucosal ischemia, we therefore advise the following:

Measure the cuff pressure using a cuff pressure gauge. A cuff pressure of 60 cmH_2O should not be exceeded.

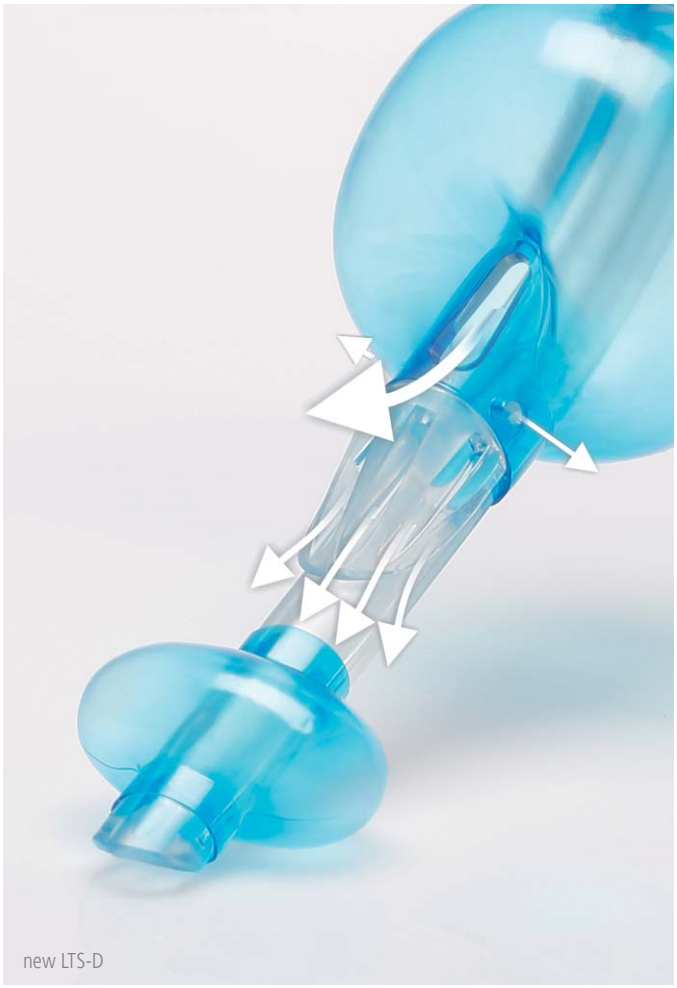
Size	Recommended cuff inflation volumes	Cuff pressure
0	max. 10 ml	< 60 cmH_2O
1	max. 20 ml	
2	max. 35 ml	
2.5	40 - 45 ml	
3	50 - 60 ml	
4	70 - 80 ml	
5	80 - 90 ml	

To ensure optimal application the syringe is made in three configurations. Please find more details on page 15.

Effective ventilation

Besides offering more space, the newly designed ventilation section provides further advantages.

previous LTS-D



new LTS-D

The new ramp attracts immediate attention: compared to the previous design, it is now conically shaped.

The previous version was produced with two large ventilation holes and four lateral eyes. The new version of the LTS-D has two lateral eyes, four long ventilation slots and one large ventilation hole. After correct tube placement, these ventilation orifices lie in front of the trachea to achieve optimal pulmonary tidal volumes.

The 2nd generation device with the largest suction possibility including correct placement confirmation for all sizes

"If tracheal intubation is not considered to be indicated but there is some (small) increased concern about regurgitation risk a second generation supraglottic airway is a more logical choice than a first generation one."

Cook, T. / Woodall, N. / Frerk, C.: 4th National Audit Project of the Royal College of Anesthetists and the Difficult Airway Society (NAP4), Major Complications of Airway Management in the United Kingdom, March 2011, chapter 11, page 95

It is recommended to use supraglottic airway devices with an additional lumen to place a gastric tube for releasing gastric pressure and preventing the risk of regurgitation and aspiration.

The previous LTS-D has a lumen suitable for gastric tubes up to 18 Fr. This is the largest drain tube for all manufacturers of supraglottic airway devices (see page 14).

The new LTS-D also incorporates a suction possibility of up to 18 Fr. Additionally the proximal aperture is now funnel shaped to facilitate gastric tube insertion.

Size	Drain tube previous LTS-D	Drain tube new LTS-D
0	n/a	10 Fr
1	n/a	10 Fr
2	n/a	16 Fr
2.5	n/a	16 Fr
3	18 Fr	18 Fr
4	18 Fr	18 Fr
5	18 Fr	18 Fr

"The successful insertion of a gastric tube enables confirmation of correct placement of the Laryngeal Tube."

Schalk, R.: Der Larynx-Tubus-Suction – Ein Notfallkonzept! Alerra-Verlag, Frankfurt am Main, 2013, page 177

previous LTS-D


new LTS-D

Clearer printing

Historically the information was printed between the connector and proximal cuff on the posterior side of the LTS-D. The printing of the new version is arranged clearly: product name, logo and size are on the anterior side while drain tube and teeth marks is still on the posterior side.

The teeth marks have been improved. The previous LTS-D had a thicker mark in the middle as orientation for the incisors and two thinner marks. A new technique has been developed according to the insertion depth.

previous LTS-D anterior side

previous LTS-D posterior side

new LTS-D anterior side

new LTS-D posterior side

New insertion depth

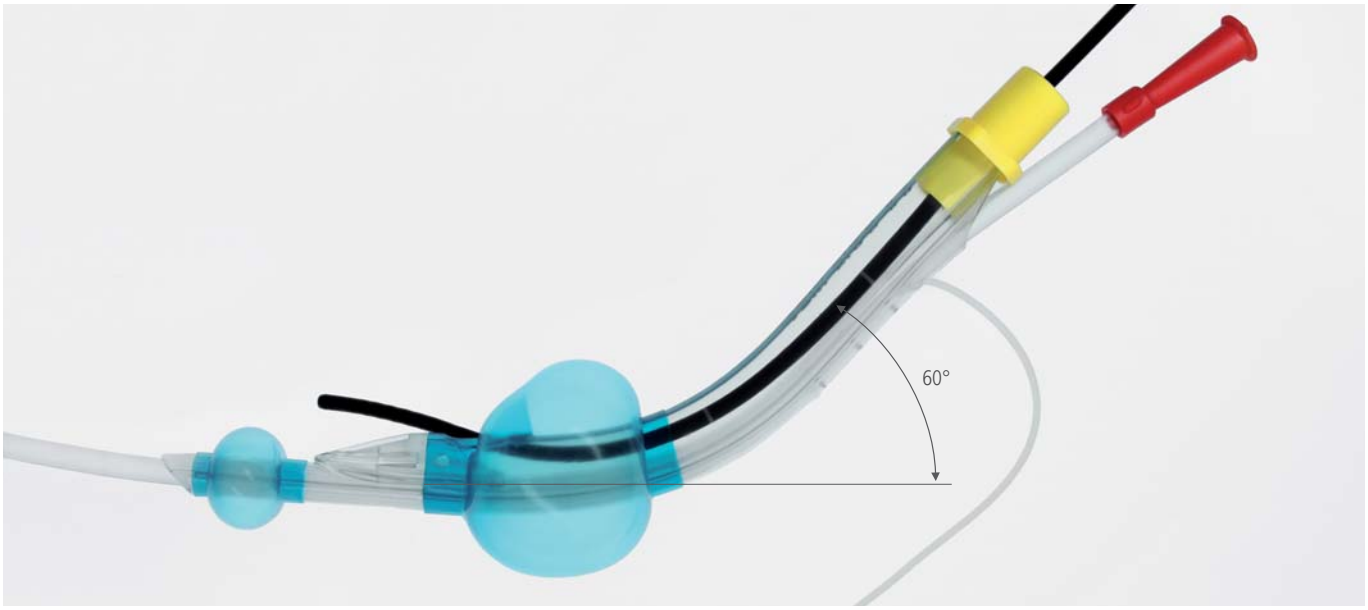
The new LTS-D has three identical teeth marks. The tube is inserted to the proximal teeth mark. Inflate the cuffs with a max. recommended volume by using a syringe. If no sufficient ventilation is achieved, the tube can be withdrawn with the inflated cuffs between the teeth marks until ventilation is easy and free flowing (large tidal volume with minimal ventilation pressure).

Overview of the functional measures and technical details

The new LTS-D is now free from phthalates. It does not contain latex and is supplied sterile for single use.

All sizes are suitable for the use with fiberoptic bronchoscopes and gastric tubes (see below chart):

Size	Patient	Weight / height	Colour	Minimal interdental distance	Fiberoptic via ventilation tube	Max. gastric tube via drain tube	Recommended cuff inflation volumes	Cuff pressure
0	Newborn	< 5 kg	transparent	10 mm	< 3.0 mm	10 Fr	max. 10 ml	< 60 cmH_2O
1	Infant	5-12 kg	white	10 mm	< 3.0 mm	10 Fr	max. 20 ml	
2	Child	12-25 kg	green	15 mm	< 4.0 mm	16 Fr	max. 35 ml	
2.5	Child	125-150 cm	orange	15 mm	< 4.0 mm	16 Fr	40 - 45 ml	
3	Adult	< 155 cm	yellow	18 mm	< 6.0 mm	18 Fr	50 - 60 ml	
4	Adult	155-180 cm	red	18 mm	< 6.0 mm	18 Fr	70 - 80 ml	
5	Adult	> 180 cm	purple	18 mm	< 6.0 mm	18 Fr	80 - 90 ml	



MRI use

Non-clinical testing has verified the LTS-D can be used in a MRI environment. The pilot balloon of the LTS-D may cause artifacts around the area where it is positioned. Change the positioning of the pilot balloon to avoid impact to the scan result.

References

Various clinical studies and algorithms prove the functionality of the Laryngeal Tube product range. It is important to know some of these studies. Please find below a list of some relevant reports.

References and algorithms for supraglottic airways with suction possibilities

- Cook, T. / Woodall, N. / Frerk, C.: 4th National Audit Project of the Royal College of Anesthetists and the Difficult Airway Society (NAP4), Major Complications of Airway Management in the United Kingdom, March 2011

International guidelines recommend the LT as an alternative device during CPR to secure the airway

- Neumar, R. et al: Circulation Journal of the American Heart Association: Part 8: Adult Advanced Cardiovascular Life Support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care
- Deakin, C. et al: European Resuscitation Council Guidelines for Resuscitation 2010, Section 4. Adult advanced life support

Cuff Pressure Measurement

- Bernhard, M. et al: Prehospital airway management using the laryngeal tube, Der Anaesthesist 63.7 (2014): 589-596
- Schalk, R. et al: Complications associated with the prehospital use of laryngeal tubes, Resuscitation 85 (2014) 1629-1632

Insertion success rates and time to insertion in pre-hospital environment

- Cavus, E. et al: Laryngeal tube S II, ProSeal laryngeal mask, and EasyTube during elective surgery: a randomized controlled comparison with the endotracheal tube in nontrained professionals. Eur J Anaesthesiol. Sep 2009; 26(9)
- Frascone, R. et al: Comparison of prehospital insertion success rates and time to insertion between standard endotracheal intubation and a supraglottic airway, Resuscitation, December 2011
- Diggs, LA et al: An update on out-of-hospital airway management practices in the United States, Resuscitation, March 2014
- Jokela, J. et al: Laryngeal tube and intubating laryngeal mask insertion in a manikin by first-responder trainees after a short video-clip demonstration, Prehospital Disaster Med 2009; 24(1):63-66
- Gamelin, A. et al: The laryngeal tube LTS-D: A quick and easy airway management device for prehospital emergency nurses. Poster Resuscitation 2014, Bilbao

Adjunct during CPR

- Wiese, Christoph H. R. et al: Using a laryngeal tube during cardiac arrest reduces "no-flow time" in a manikin study: a comparison between laryngeal tube and endotracheal tube. Wiener Klinische Wochenschrift, Springer Verlag 2008, 120/7-8:217-223

Competition

For airway management there is a large choice of supraglottic airway devices. The majority do not establish a market share. With more than 16 million insertions since its introduction the Laryngeal Tube plays an important role as an alternative to intubation and mask ventilation. One of the most important international anaesthesia reports, the NAP4, recommends using 2nd generation supraglottic airway devices. The built-in drain tube allows the insertion of a gastric tube to release gastric pressure and prevent the risk of regurgitation and aspiration. The trend to disposable 2nd generation supraglottic airway devices is noticeable. The new LTS-D complies with these requirements and has been improved and clinically adjusted compare to its previous version.

The currently well-known disposable 2nd generation supraglottic airway devices are:

Ambu® AuraGain™	(Ambu)	LMA Supreme™	(Teleflex)
COMBITUBE™	(Covidien)	LTS-D	(VBM Medizintechnik)
i-gel	(Intersurgical)		

Compared to other supraglottic airway devices, the LTS-D convinces by its intuitive use and short learning curve during training. The relatively thin tube design allows insertion on patients with reduced mouth opening and in different patient positions. [1]
The Laryngeal Tube allows uninterrupted cardiac compressions during CPR (cardiopulmonary resuscitation) thanks to its high airway leak pressure. [2]
A further advantage of the LTS-D is the largest drain tube for up to 18 Fr gastric tubes: [3] [4] [5]

LTS-D	
Sizes	**Max. gastric tube**
0, 1	10 Fr
2, 2.5	16 Fr
3, 4, 5	18 Fr

Further supraglottic airway devices:

Product	Sizes	Max. gastric tube
LMA Supreme™	1, 1.5 2, 2.5 3, 4, 5	6 Fr 10 Fr 14 Fr
i-gel	1 1.5 2, 2.5, 3, 4 5	n/a 10 Fr 12 Fr 14 Fr
Ambu® AuraGain™	3, 4, 5	14 Fr

[1] Hagberg, C.: Benumof and Hagberg's Airway Management, 3rd edition, 2013, page 493-494
[2] Ocker, H. et al: A comparison of the laryngeal tube with the laryngeal mask airway during routine surgical procedures, Anesth Analg. 2002 Oct; 95(4):1094-7
[3] Instructions for use, LMA Supreme™
[4] User manual i-gel, page 15
[5] Brochure Ambu® AuraGainTM, Ambu GmbH

Order information

LTS-D Single Set

Size	Patient	Weight / height	Colour	LTS-D Single Set	Scope of delivery Laryng. Tube	Syringe
0	Newborn	< 5 kg	transparent	**REF 32-06-100-1**	1 x # 0	20 ml
1	Infant	5-12 kg	white	**REF 32-06-101-1**	1 x # 1	20 ml
2	Child	12-25 kg	green	**REF 32-06-102-1**	1 x # 2	60 ml
2.5	Child	125-150 cm	orange	**REF 32-06-125-1**	1 x # 2.5	60 ml
3	Adult	< 155 cm	yellow	**REF 32-06-103-1**	1 x # 3	60 ml
4	Adult	155-180 cm	red	**REF 32-06-104-1**	1 x # 4	100 ml
5	Adult	> 180 cm	purple	**REF 32-06-105-1**	1 x # 5	100 ml

LTS-D Set of 10

Size	Patient	Weight / height	Colour	LTS-D Set of 10	Scope of delivery Laryng. Tube	Syringe
0	Newborn	< 5 kg	transparent	**REF 32-06-000-1**	10 x # 0	–
1	Infant	5-12 kg	white	**REF 32-06-001-1**	10 x # 1	–
2	Child	12-25 kg	green	**REF 32-06-002-1**	10 x # 2	–
2.5	Child	125-150 cm	orange	**REF 32-06-025-1**	10 x # 2.5	–
3	Adult	< 155 cm	yellow	**REF 32-06-003-1**	10 x # 3	–
4	Adult	155-180 cm	red	**REF 32-06-004-1**	10 x # 4	–
5	Adult	> 180 cm	purple	**REF 32-06-005-1**	10 x # 5	–

LTS-D Emergency Set

Size	Patient	Weight / height	Colour	LTS-D Emergency Set	Scope of delivery Laryng. Tube	Syringe
0	Newborn	< 5 kg	transparent	Child **REF 32-06-309-1**	1 x # 0, 1, 2, 2.5	60 ml
1	Infant	5-12 kg	white			
2	Child	12-25 kg	green			
2.5	Child	125-150 cm	orange			
3	Adult	< 155 cm	yellow	Adult **REF 32-06-209-1**	1 x # 3, 4, 5	100 ml
4	Adult	155-180 cm	red			
5	Adult	> 180 cm	purple			

The new **LTS-D** –
safe in routine and emergency.

Distributed by:

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