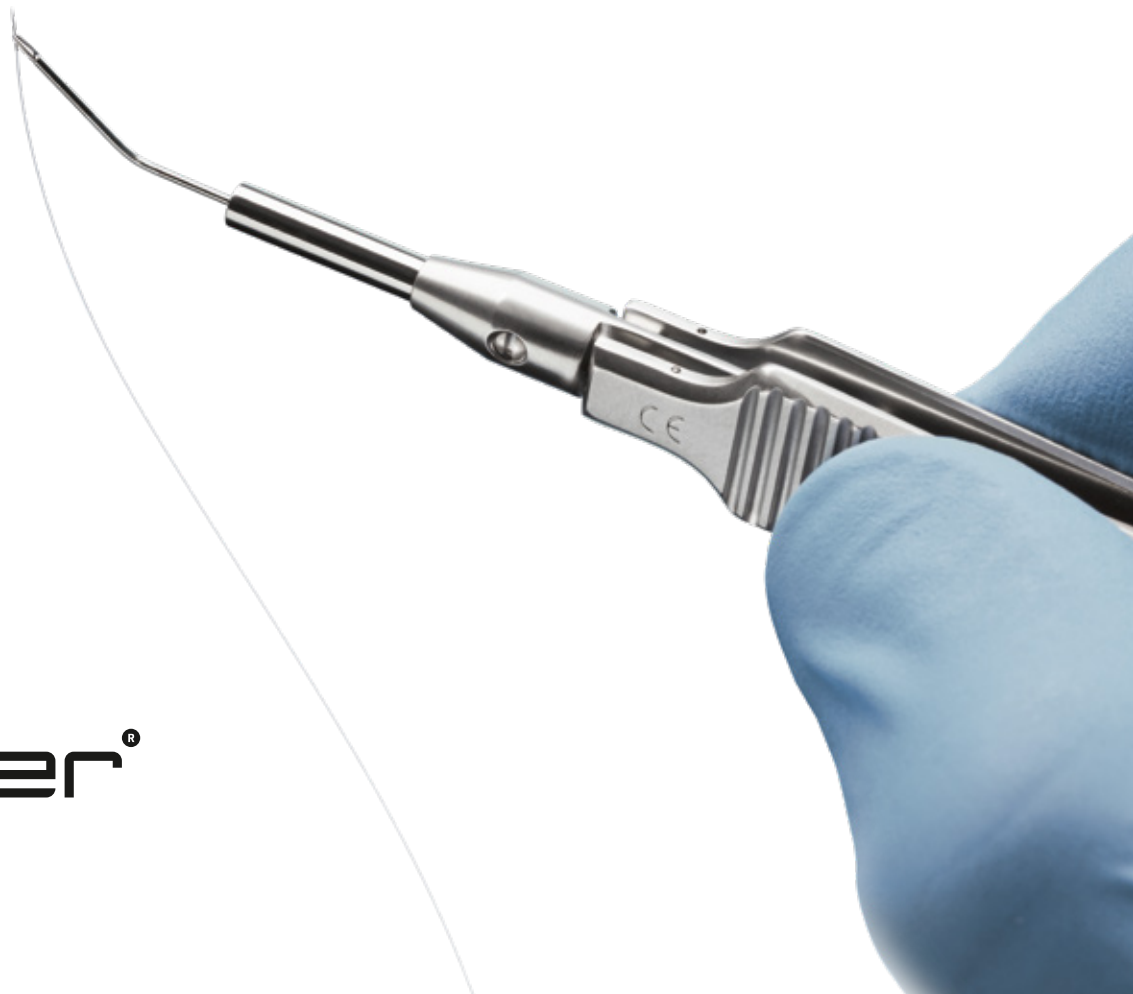




NanoEdge[®]

Surgical Sutures
for Ophthalmic Surgery

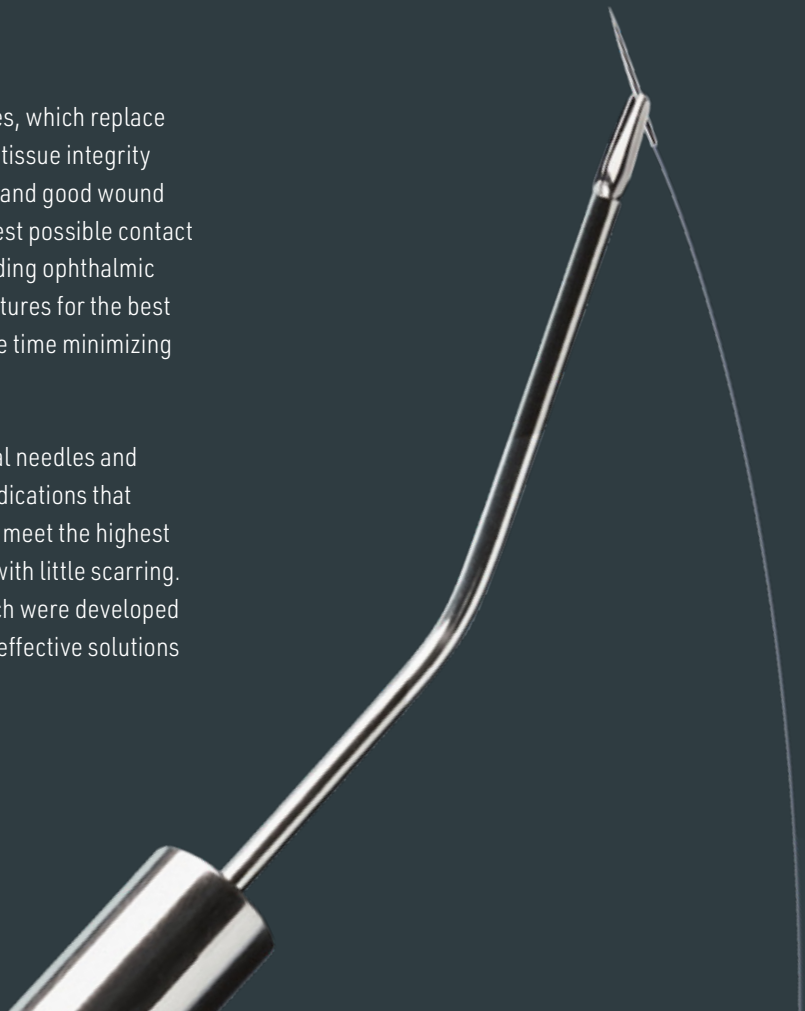


Geuder[®]
Germany

NanoEdge[®] Premium Surgical Sutures

Surgical sutures are certified medical devices, which replace the mechanical bridging function of missing tissue integrity in the short, medium or long term. For quick and good wound healing, the sutures should create the greatest possible contact between the separated tissue parts. Demanding ophthalmic surgical applications require high-quality sutures for the best possible wound adaptation while at the same time minimizing tissue trauma.

Geuder AG offers a broad portfolio of surgical needles and sutures for almost all ophthalmic surgical indications that require precise stitches. NanoEdge[®] sutures meet the highest surgical demands and yield optimal results with little scarring. NanoEdge[®] stands for quality products, which were developed with leading surgeons to offer practical and effective solutions for ophthalmology.



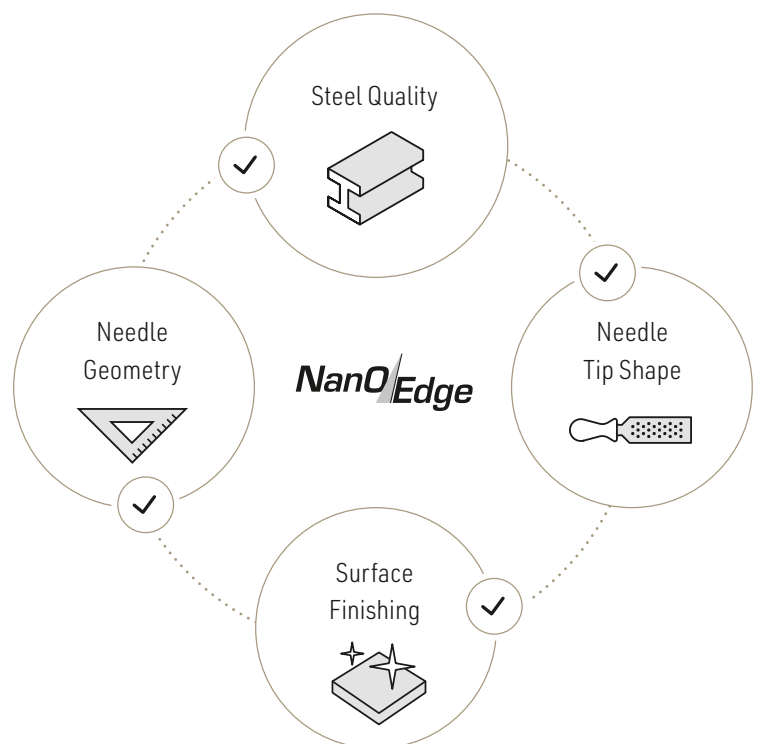
The Needles – High Precision in Small Scale

NanoEdge® needles are made from a highly tempered and virtually unbreakable special steel with high bending resistance. Due to the innovative and highly automated manufacturing process, precise needle geometries and accurate needle grinds can be realized, which enable stitching of fine types of tissue in small space.

The high-quality surface finishing of many NanoEdge® needles offers optimal penetration and thus little trauma to the tissue. The result is a reliable wound adaptation with barely visible scars for excellent restoration of tissue function.

Quality Features of NanoEdge® Needles

- High resistance to bending and breakage
- Optimized penetration
- Accurate grind of the needle tip shape
- Low tissue trauma

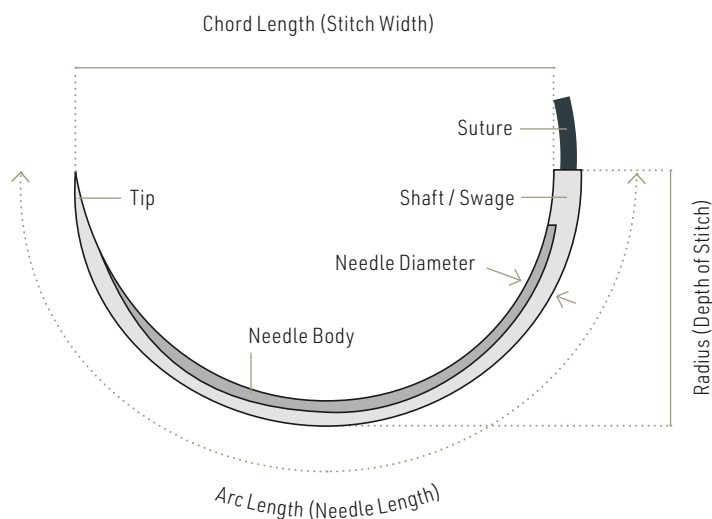


Needle Properties

Suture Technique and Tissue Determine the Specifications of the Needle

The Following Features Have an Impact

- Needle shape (cross-section)
- Needle tip
- Needle diameter
- Curvature
- Arc length (needle length)
- Armed (The choice between single and double armed enables different techniques or a more cost-effective use)



Curvature

Straight



1/2 Circle



3/8 Circle

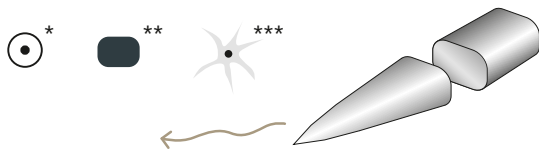


1/4 Circle

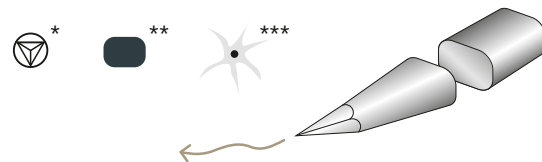


Needle Shape and Needle Tip

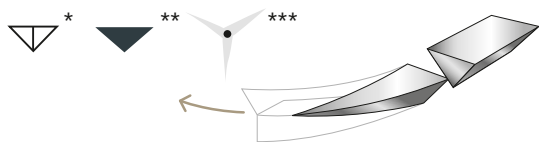
R = Taper Point



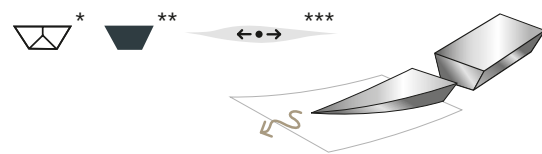
RT = Taper Cutting



S = Reverse Cutting



SP = Spatula



* Cross-Section Needle Tip ** Cross-Section Needle Body *** Cross-Section Suture Channel

The NanoEdge® Needle Code Contains All Relevant Specifications

NY 09 3 1 62 SP

Suture Material

- PE = Polyester
- PP = Polypropylene
- SI = Silk
- NY = Nylon / Polyamide
- PG = Polyglycolic Acid

Suture Diameter

- 04 = 4-0
- 05 = 5-0
- 06 = 6-0
- 07 = 7-0
- 08 = 8-0
- 09 = 9-0
- 10 = 10-0

Needle Curvature

- 1 = Straight
- 2 = 1/2 Circle
- 3 = 3/8 Circle
- 4 = 1/4 Circle

Armed

- 1 = Single
- 2 = Double

Needle Length (mm)

6.2 mm

Needle Type (Tip Grind)

- ⊙ R = Taper Point
- ⊗ RT = Taper Cutting
- ▽ S = Reverse Cutting
- ⊞ SP = Spatula

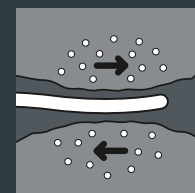
Suture Materials for Optimal Wound Adaption

Outstanding Properties:

- High tensile strength resp. tear resistance
- Secure knot positioning
- Easy knot tying
- Low capillarity
- Optimal tissue compatibility
- Good sliding properties through tissue
- Good visibility
- Easy to use

Selection Criteria:

- Absorption characteristics
- Tissue compatibility
- Structure, texture and diameter
- Elasticity and strength



Suture Diameter

United States Pharmacopeia (USP)	Diameter [mm]	European Pharmacopeia (EP)
11-0	0.010 – 0.019	0.1
10-0	0.020 – 0.029	0.2
9-0	0.030 – 0.039	0.3
8-0	0.040 – 0.049	0.4
7-0	0.050 – 0.069	0.5
6-0	0.070 – 0.099	0.7
5-0	0.100 – 0.149	1.0
4-0	0.150 – 0.199	1.5
3-0	0.200 – 0.249	2.0

Absorption Characteristics and Tissue Compatibility

NanoEdge® sutures are made from biocompatible raw materials for good tissue compatibility. The absorbable suture material* NanoEdge® PGA supports natural wound healing until the shape and function of the tissue are restored. The non-absorbable suture materials NanoEdge® PP, NanoEdge® PES, NanoEdge® SE and NanoEdge® PA are used for permanent wound adaptation in order to restore tissue function.



Absorbable Material

is degradable by hydrolysis and adapts to the tissue during the healing phase. It increasingly loses its tensile strength and tear resistance:

NanoEdge® PGA Polyglycolic Acid

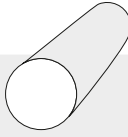
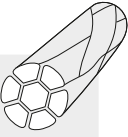


Non-Absorbable Materials

remain almost unchanged in the tissue (inert) and are integrated into the wound scar:

NanoEdge® PA Polyamide
 NanoEdge® PP Polypropylene
 NanoEdge® PES Polyester
 NanoEdge® SE Silk

Material Structure and Properties

	Monofilament Material 	Multifilament Material (Braided, Coated) 
Advantages	<ul style="list-style-type: none"> · No capillarity · No sawing effect · Easy to pull through tissue · Low traumatic effect 	<ul style="list-style-type: none"> · High tear resistance · Secure knot positioning · Smooth handling · Easy to use
Challenges	<ul style="list-style-type: none"> · Knot tying requires practice and experience 	<ul style="list-style-type: none"> · Higher stress to tissue because of surface structure
Material Examples	<ul style="list-style-type: none"> · Polypropylene (PP) · Polyamide (PA) 	<ul style="list-style-type: none"> · Silk (SE) · Polyglycolic acid (PGA) · Polyester (PES)

* Absorption time is the time, in which the suture material loses 50 % of its tear resistance, not to be confused with complete material degradation

Specifications of Suture Materials

	NanoEdge® PGA		NanoEdge® PA	NanoEdge® PP	NanoEdge® PES	NanoEdge® SE
Absorbability	absorbable		non-absorbable	non-absorbable	non-absorbable	non-absorbable
Structure	multifila- ment, braided	mono- filament	monofilament	monofilament	multifilament, braided	multifilament, braided
Colors	violet 5-0 to 8-0 undyed 5-0 and 6-0	violet	black	blue	white	black
USP (Diameter)	5-0 to 8-0	9-0 and 10-0	6-0 to 10-0	6-0, 7-0, 9-0 and 10-0	4-0	6-0 and 7-0
Material	Polyglycolic acid (PGA)		Polyamide (Nylon)	Polypropylene (PP)	Polyester (PES)	Natural silk
Coating	Poly- caprolac- tone and Calcium stearate	none	none	none	Silicone NuSil MED- 2174	Silicone NuSil MED- 2174
Additional features	<ul style="list-style-type: none"> · Half-life period 2 weeks · For plastic surgery (skin suture) · Optimal knot security 		<ul style="list-style-type: none"> · Especially smooth with high tear resistance · Fine monofilaments especially for micro surgery 	<ul style="list-style-type: none"> · High tear resistance · Durable 	<ul style="list-style-type: none"> · High tear resistance · Durable · Special coating for minimum trauma to tissue 	<ul style="list-style-type: none"> · Very smooth due to delicate structure · Low mechanical foreign body effect

Application Examples of Suture Materials

	NanoEdge® PGA	NanoEdge® PA	NanoEdge® PP	NanoEdge® PES	NanoEdge® SE
<p>Clinical Application*</p> <p>Suture USP, Curvature, Needle Length and Type</p> <p>Curvatures:</p> <p>1 = Straight 2 = 1/2 Circle 3 = 3/8 Circle 4 = 1/4 Circle</p> <p>Needle Types:</p> <p>R = Taper Point RT = Taper Cutting S = Reverse Cutting SP = Spatula</p>	<ul style="list-style-type: none"> • Strabismus 5-0 - 6-0 4 8.5 SP • Eyelid and Conjunctiva Suture 7-0 - 8-0 3 6.4 SP • Transcutaneous Levator Resection (pediatric) 7-0 3 6.4 SP • Lateral Tarsal Strip 6-0 4 8.0 SP • Blepharoplasty 7-0 - 8-0 3 6.4 SP • Chalazion, Hordeolum and Xanthelasma 7-0 - 8-0 3 6.4 SP • Pterygium 9-0 - 10-0 3 6.4 SP • Glaucoma 10-0 3 6.4 SP 	<ul style="list-style-type: none"> • Ocular Muscles 6-0 3 13 SP • Skin 7-0 2 8 S • Glaucoma 10-0 3 6.2 SP • Cornea Suture, Keratoplasty and Fixation of Amnion 9-0 - 10-0 3 6.2 SP 	<ul style="list-style-type: none"> • Skin and Ocular Muscles 6-0 3 9.4 RT • Blepharoplasty 7-0 3 7.8 S • Transcutaneous Levator Resection 7-0 3 7.8 S • Intraocular Micro Suture 9-0 - 10-0 1 2 R 	<ul style="list-style-type: none"> • Eyelid and Conjunctiva Suture 5-0 2 8.5 SP • Scleral Buckling 4-0 - 5-0 2 8.5 SP 	<ul style="list-style-type: none"> • Skin and Ocular Muscles 6-0 3 7.8 S • Sclera and Ocular Muscles 6-0 3 11 SP • Control Suture 5-0 4 8.5 SP • Sclera Suture 7-0 3 7.8 S

* We do not assume liability for the application examples. They are only suggestions from the relevant specialist literature and from training materials

Item Overview

Absorbable

Item Number	Needle Tip (Cross-Section)	Needle (Original Size)	Armed	Curvature	Needle Type	Needle Length (mm)	Needle Diameter (µm)	Suture USP	Suture Length (cm)	Suture Color	Suture Structure	Coating	Packaging Unit
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NanoEdge® PGA Polyglycolic Acid

G-PG052280SP			2x	1/2	SP	8	350	5/0	45	undyed	multifilament	PCL + Ca	12
G-PG062280SP							300	6/0		undyed			
G-PG083178S			1x	3/8	S	7.8	230	8/0	30	violet	multifilament	PCL + Ca	12
G-PG083160SP			1x	3/8	SP	6	200	8/0	30	violet	multifilament	PCL + Ca	12
G-PG063111S			1x	3/8	SP	11	330	6/0	45	undyed	multifilament	PCL + Ca	12
G-PG053213S			2x	3/8	SP	13	430	5/0	45	violet	multifilament	PCL + Ca	12
G-PG103155SP			1x	3/8	SP	5.5	150	10/0	15	violet	monofilament	none	12
G-PG063180SP			1x	3/8	SP	8	300	6/0	30	undyed	multifilament	PCL + Ca	12
G-PG073164SP						6.4	200	7/0	30	violet			
G-PG103162SP						6.2	150	10/0	15	violet			
G-PG073264SP			2x	3/8	SP	6.4	200	7/0	45	violet	multifilament	PCL + Ca	12
G-PG093264SP						200	9/0	30	monofilament		none		
G-PG103262SP						6.2	150	10/0	30		multifilament	PCL + Ca	
G-PG083260SP						6.0	200	8/0	30		multifilament	PCL + Ca	
G-PG083360SP						6.0	200	8/0	45		multifilament	PCL + Ca	
G-PG063280SP			2x	3/8	SP	8	300	6/0	45	violet	multifilament	PCL + Ca	12
G-PG064380SP			2x	1/4	SP	8	300	6/0	45	violet	multifilament	PCL + Ca	12
G-PG064480SP										undyed			
G-PG054280SP			2x	1/4	SP	8	350	5/0	45	violet	multifilament	PCL + Ca	12
G-PG064280SP							300	6/0	25				

Non-Absorbable

Item Number	Needle Tip (Cross-Section)	Needle (Original Size)	Armed	Curvature	Needle Type	Needle Length (mm)	Needle Diameter (µm)	Suture USP	Suture Length (cm)	Suture Color	Suture Structure	Coating	Packaging Unit
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NanoEdge® PA Polyamide (Nylon)

G-NY072180S			1x	1/2	S	8	230	7/0	30	black	monofilament	none	12
G-NY092150SP			1x	1/2	SP	5	100	9/0	20	black	monofilament	none	12
G-NY102155SP			1x	1/2	SP	5.5	150	10/0	15	black	monofilament	none	12
G-NY103150RT			1x	3/8	RT	5	70	10/0	20	black	monofilament	none	12
G-NY063113S			1x	3/8	SP	13	350	6/0	45	black	monofilament	none	12
G-NY093162SP			1x	3/8	SP	6.2	150	9/0	15	black	monofilament	none	12
G-NY103162SP								10/0					
G-NY103262SP			2x	3/8	SP	6.2	150	10/0	30	black	monofilament	none	12

NanoEdge® PP Polypropylene

G-PP063294RT			2x	3/8	RT	9.4	200	6/0	30	blue	monofilament	none	12
G-PP063178S			1x	3/8	S	7.8	250	6/0	45	blue	monofilament	none	12
G-PP073178S								7/0					
G-PP073278S			2x	3/8	S	7.8	230	7/0	75	blue	monofilament	none	12
G-PP091120R			1x	1/1	R	2	100	9/0	10	blue	monofilament	none	12
G-PP101120R								10/0					

NanoEdge® PES Polyester

G-PE042285SP			2x	1/2	SP	8.5	460	4/0	45	white	multifilament	NuSil	12
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NanoEdge® SE Silk

G-SI063178S			1x	3/8	S	7.8	200	6/0	30	black	multifilament	NuSil	12
G-SI073178S								7/0	45				
G-SI063278S			2x	3/8	S	7.8	250	6/0	45	black	multifilament	NuSil	12
G-SI073278S								200					
G-SI063111S			1x	3/8	SP	11	300	6/0	45	black	multifilament	NuSil	12

Geuder[®]
Germany

Geuder reserves the right to make changes to technical details in response to recent developments. Geuder does not assume liability for the accuracy of each individual statement. Illustrations are not drawn to scale.

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