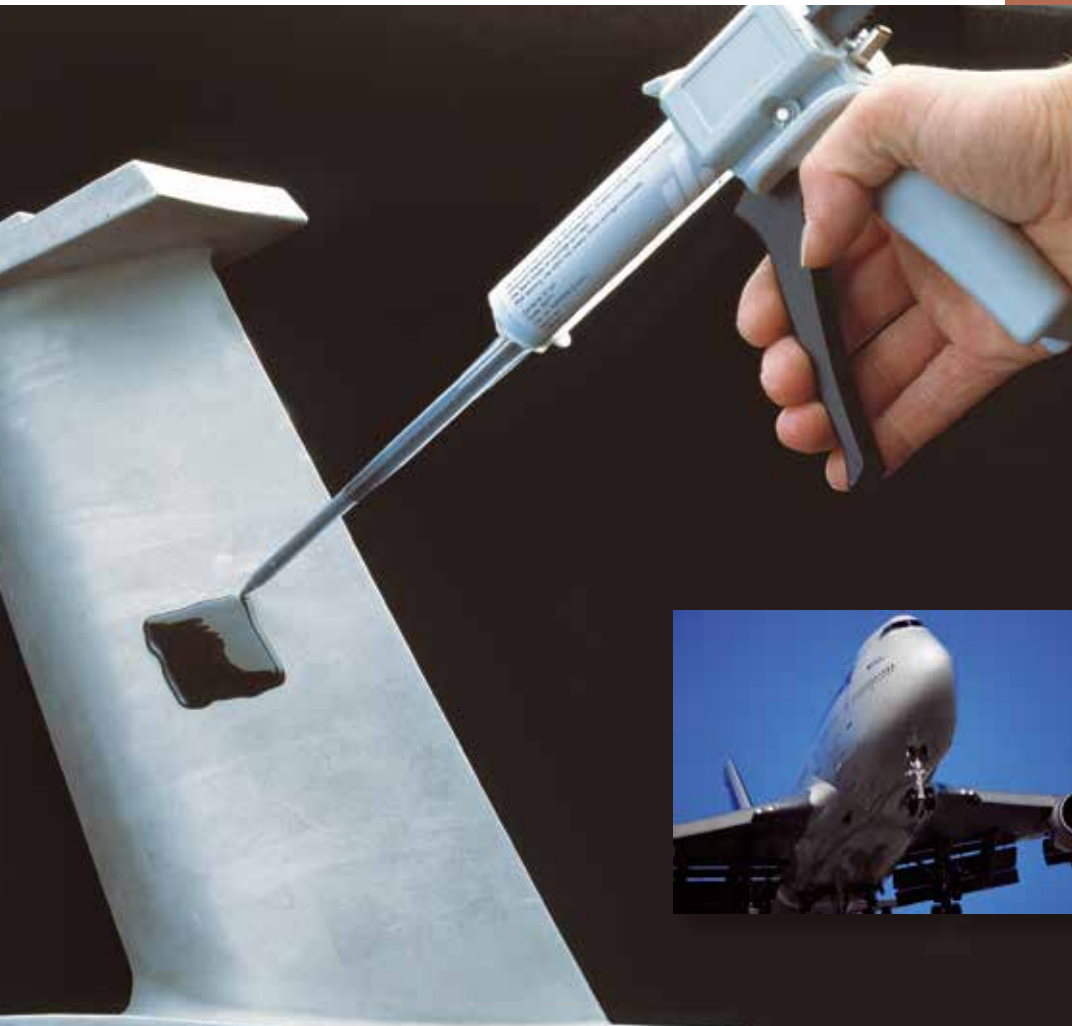


RepliSet



**An advanced
replica technique
for the inspection of
critical surfaces**



The most versatile replicating system

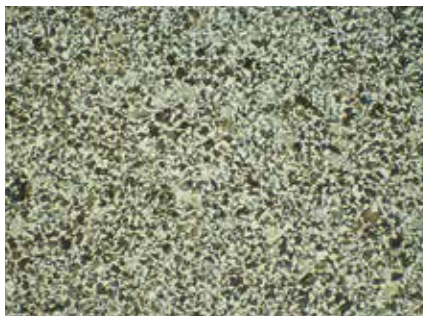
**For non-destructive testing and field applications
For engineering inspection and forensic investigation**

Replicate in the field – examine in the laboratory

- High resolution: down to 0.1 micron
- Virtually no shrinkage: dimensionally accurate for measurement purposes
- Optimized for either optical microscopy or comparator macroscopy
- Other inspection techniques include SEM, laser metrology and interferometry
- Extensive operator experience is not necessary
- Replicas of any size and shape can be produced
- Flexible high strength replicas can be taken from inaccessible surfaces and can be removed from moderately re-entrant geometry
- Short curing time
- Can replicate surfaces over a wide range of temperature

*Medium C-steel. Sample
etched with Nital 3%.
Magnification x100*

Sample



Replica

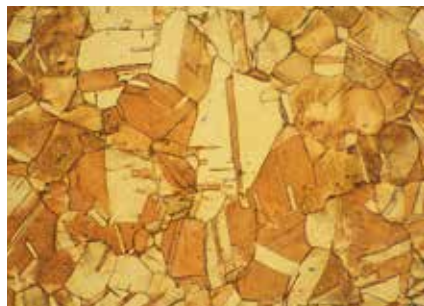


RepliSet is a complete system for replicating materials. It is designed to transfer the structure of a solid surface to a flexible, highly accurate and stable replica. The result is an exact 3D copy of the surface, allowing microscopic examination and precise measurements. RepliSet is an accepted replicating system for ASTM standard E 1351 "Standard Practice for Production and Evaluation of Field Metallographic Replicas".

RepliSet is a specially formulated, fast curing, two-part silicone rubber. The compounds are supplied in cartridges and are applied using dispensing guns. The cartridges contain both polymer and curing agent, which are automatically mixed in a disposable static-mixing nozzle during application to the surface. Various, reusable nozzle tips are available for spreading the compound on a flat surface or for conducting the compound into holes and cavities.

RepliFix is a less advanced parallel to RepliSet. RepliFix and RepliSet are designed to bond together. The two components are mixed and applied by hand. RepliFix is used as support for RepliSet or as a stand alone product for

*Pure
copper.
Sample
etched
with cupric
chloride
and
ammonia.
Magnifi-
cation
x100*



Sample



Replica

moulding of surface shape for low tech applications.

A backing slide bonds to the RepliSet or RepliFix replica. The backing slide serves to maintain the original profile and ensures a flat back to the replica.

A specially-designed backing paper, which bonds to the replica, is optional but it facilitates the handling, labelling and protection of the replica. The backing paper also allows thin replicas of curved surfaces to be taped flat on glass slides for microscopic examination.

Replicating has never been so easy

With the easy-to-operate dispensing gun, everybody can produce perfect replicas first time. Extensive operator experience is unnecessary and you can be sure to return to the lab with good replicas.

In routine inspection situations, replicas produced by a person present in the field can be evaluated at specialist laboratories. With the best possible success rate, RepliSet saves you time and consumables.

Any type and any shape

Most common solid materials such as metals, ceramics, plastics and glass can be replicated. It works even on rough re-entrant surfaces.

There are no size or thickness limitations. The compound can be dispensed



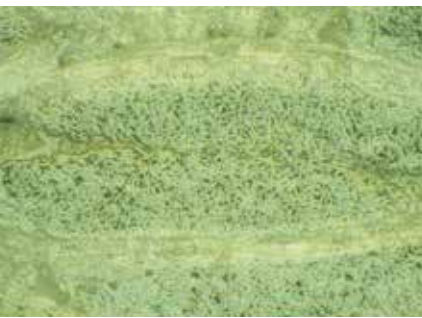
*An operator dispenses
RepliSet onto a sample*



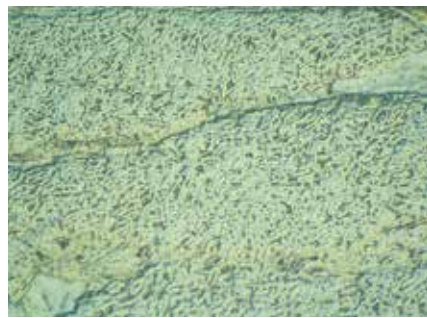
*An operator peels off
the cured replica*



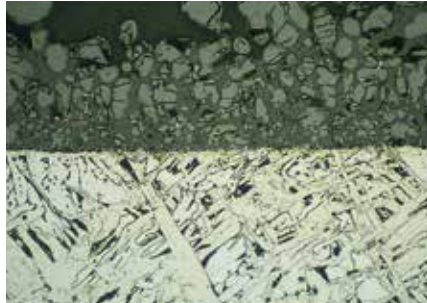
Sample



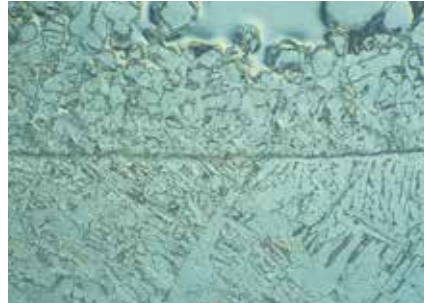
Replica



Kevlar fibre. RepliSet shows better image than original due to fibres' translucent behaviour. Magnification x 200



Sample using Bright Field



Replica using DIC

Overheated steel with corrosion layer. Etched with Nital 3%. Magnification x100



on any surface shape allowing inspection at remote locations where access is difficult, such as inside pipes or machinery. As the RepliSet replicas have a high tear strength and flexibility they can easily be removed from moderately re-entrant geometry without damage or distortion. Upon release, the material returns to its original shape.

A positive replica of a 3D surface can be produced by replicating the original replica with the compound itself or with an epoxy resin.

Under all conditions

The compound is available in versions with a range of viscosities and curing times tailored for application under different working conditions and on horizontal as well as vertical or overhead surfaces.

Generally, the weather is no problem. Being water-repellent, RepliSet can provide replicas under humid conditions. It will

cure on surfaces in a temperature range from -10°C to +180°C allowing rapid inspection and minimizing possible machinery downtime.

High resolution and form stability

RepliSet offers a very high resolution down to 0.1 micron.

RepliSet has no shrinkage, and is therefore suitable for high accuracy metrology measurements.

Replicas can be transported without any problems and can be stored indefinitely for future reference.

RepliSet is safe

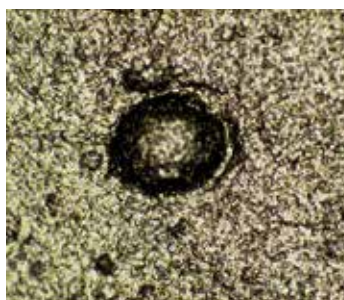
RepliSet compounds are solvent free and cleared for all normal modes of transportation, including air.

During work the operator is not exposed to any unhealthy fumes.

The compounds are approved for use on stainless steel in nuclear plants.

Laser measurement of pitting

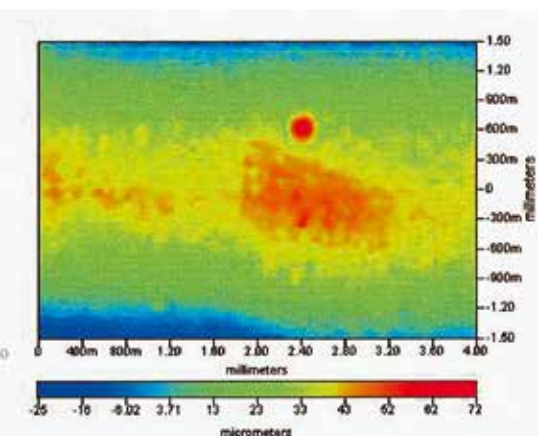
Replica of pitting

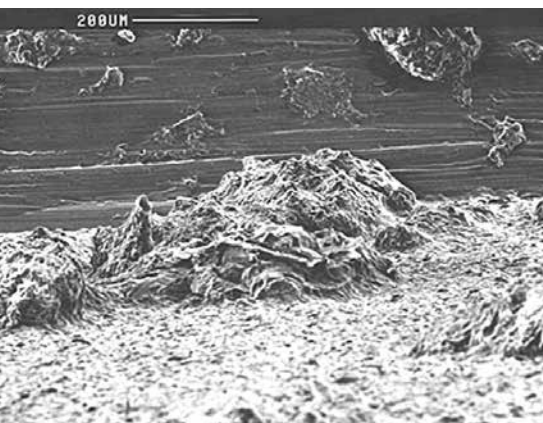


Depth of pitting

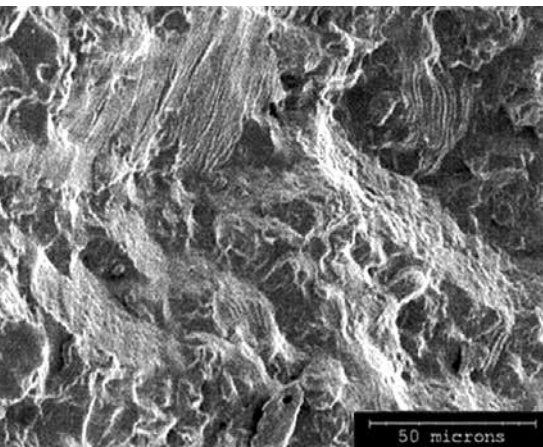


Width of pitting

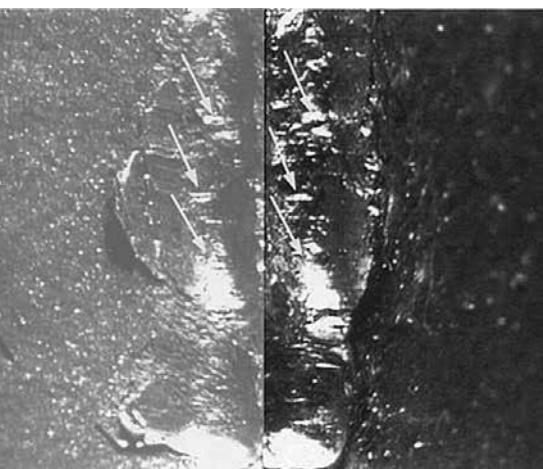




Replica of pitting. Examined by SEM



SEM micrograph of RepliSet replica of fatigue crack



The marks from previous use of the tool are identical



The materials are designed specifically to be compatible with stainless steels and other engineering alloys and not to compromise future corrosion behavior after replication.

A variety of examination methods

The black coloured RepliSet-F and -T types are optimized for optical microscopy using reflected light. The replicas will reflect light like a metal. This makes them very well-suited for microstructural examination at magnifications up to x500 using Bright Field, Dark Field or DIC. White light interferometry can be used for precise surface measurements including determination of surface finish. Replicas can often give better results than the original surface, because of the uniformity of their reflection.

The grey coloured RepliSet-GF and -GT types have been formulated for macroscopy. The replica will give a high image contrast, when the surface is examined in a stereomicroscope with oblique illumination. This is particularly advantageous for monitoring of surface degradation, fracture surfaces, damage or wear. The products also have great potential for many metrology applications and for forensic examination of tool marks by comparator macroscopy. The grey types are not suitable for optical microscopy using reflected light.

All replicas are suitable for 3D examination at high magnifications by SEM either directly, using low values of column voltage, or after metallic coating.

3D examination can be carried out using non-contact metrology methods such as interferometry, laser scanning and shadowgraph projection.

Macrophoto of RepliSet-GF1 replica of cracking and pitting in heat affected zone in stainless steel



Engineering inspection applications

Typical applications are on-site non-destructive testing in connection with quality control, inspection, maintenance, reconditioning and failure analysis, typically within high tech engineering industries including power generation (fossil fuel or nuclear), aerospace, offshore industry, etc.

The use of high-resolution RepliSet replicas allows otherwise inaccessible surfaces and irregularities in critical machinery in service to be examined and measured under laboratory conditions.

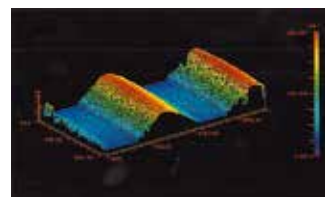
Typical tasks are:

- detection and monitoring of pitting, corrosion, cracking, creep, deformation and wear
- assessment of change in micro-structure
- inspection of internal surfaces such as bolt hole threads and root welds in small bore tubes
- quality control of edges, heights, angles, surface finish, thread profiles and other dimensions

Forensic investigation

In the course of forensic investigations comparator macroscopy / microscopy is used to identify whether fine scratch details found in tool-marks can be related to features on the original tool.

RepliSet-G is employed for replicating tool marks in the field. Comparison marks produced on lead using a suspect



tool are similarly replicated and the replicas may be compared by comparator microscopy.

Case for RepliSet

The RepliSet Case is designed for transportation and use of the 50 ml RepliSet system. It is made of aluminium and is at the same time elegant and sturdy. It can be carried as hand luggage by air and is compact and sturdy to such an extent, that it can be taken to locations with narrow or difficult access.

The contents is either fixed by straps in the lid or placed in compartments in the two detachable foam rubber inserts. Each item has its fixed position. The user has access to all that is needed to perform a regular replication by just opening the lid of the RepliSet Case. The lower insert carries a small stock of consumables.

RepliSet is an accepted replicating system for ASTM standard E 1351 "Standard Practice for Production and Evaluation of Field Metallographic Replicas".

The 50 ml system



The 265 ml system



Struers ApS
Pederstrupvej 84
DK-2750 Ballerup, Denmark
Phone +45 44 600 800
Fax +45 44 600 801
struers@struers.dk
www.struers.com

AUSTRALIAN & NEW ZEALAND
Struers Australia
27 Mayneview Street
Milton QLD 4064
Australia
Phone +61 7 3512 9600
Fax +61 7 3369 8200
info.au@struers.dk

BELGIUM (Wallonie)
Struers S.A.S.
370, rue du Marché Rollay
F- 94507 Champigny
sur Marne Cedex
Téléphone +33 1 5509 1430
Télécopie +33 1 5509 1449
struers@struers.fr

BELGIUM (Flanders)
Struers GmbH Nederland
Zomerdijk 34 A
3143 CT Maassluis
Telefoon +31 (10) 599 7209
Fax +31 (10) 5997201
netherlands@struers.de

CANADA
Struers Ltd.
7275 West Credit Avenue
Mississauga, Ontario L5N 5M9
Phone +1 905-814-8855
Fax +1 905-814-1440
info@struers.com

CHINA
Struers Ltd.
No. 1696 Zhang Heng Road
Zhang Jiang Hi-Tech Park
Shanghai 201203, P.R. China
Phone +86 (21) 6035 3900
Fax +86 (21) 6035 3999
struers@struers.cn

CZECH REPUBLIC & SLOVAKIA
Struers GmbH Organizační složka
všeobecnotechnický park
Pělešská 1920,
CZ-252 63 Roztoky u Prahy
Phone +420 233 312 625
Fax +420 233 312 640
czechrepublic@struers.de
slovakia@struers.de

GERMANY
Struers GmbH
Carl-Friedrich-Benz-Straße 5
D- 47877 Willich
Telefon +49 (0) 2154 486-0
Fax +49 (0) 2154 486-222
verkauf@struers.de

FRANCE
Struers S.A.S.
370, rue du Marché Rollay
F-94507 Champigny
sur Marne Cedex
Téléphone +33 1 5509 1430
Télécopie +33 1 5509 1449
struers@struers.fr

HUNGARY
Struers GmbH
Magyarországi Fióktelep
Tatai ut 53
2821 Gyermely
Phone +36 (34) 880546
Fax +36 (34) 880547
hungary@struers.de

IRELAND
Struers Ltd.
Unit 11 Evolution@ AMP
Whittle Way, Catcliffe
Rotherham S60 5BL
Tel. +44 0845 604 6664
Fax +44 0845 604 6651
info@struers.co.uk

ITALY
Struers Italia
Via Monte Grappa 80/4
20020 Arese (MI)
Tel. +39-02/38236281
Fax +39-02/38236274
struers.it@struers.it

JAPAN
Marumoto Struers K.K.
Takanawa Muse Bldg. 1F
3-14-13 Higashi-Gotanda,
Shinagawa
Tokyo
141-0022 Japan
Phone +81 3 5488 6207
Fax +81 3 5488 6237
struers@struers.co.jp

NETHERLANDS
Struers GmbH Nederland
Zomerdijk 34 A
3143 CT Maassluis
Telefoon +31 (10) 599 7209
Fax +31 (10) 5997201
netherlands@struers.de

NORWAY
Struers ApS, Norge
Sjøskogveien 44C
1407 Vinterbro
Telefon +47 970 94 285
info@struers.no

AUSTRIA
Struers GmbH
Zweigniederlassung Österreich
Betriebsgebiet Puch Nord 8
5412 Puch
Telefon +43 6245 70567
Fax +43 6245 70567-78
austria@struers.de

POLAND
Struers Sp. z o.o.
Oddział w Polsce
ul. Jasnogórska 44
31-358 Kraków
Phone +48 12 661 20 60
Fax +48 12 626 01 46
poland@struers.de

ROMANIA
Struers GmbH, Sucursala Bucuresti
Str. Preciziei nr. 6R
062203 sector 6, Bucuresti
Phone +40 (31) 101 9548
Fax +40 (31) 101 9549
romania@struers.de

SWITZERLAND
Struers GmbH
Zweigniederlassung Schweiz
Weissenbrunnstraße 41
CH-8903 Birmensdorf
Telefon +41 44 777 63 07
Fax +41 44 777 63 09
switzerland@struers.de

SINGAPORE
Struers Singapore
627A Aljunied Road,
#07-08 BizTech Centre
Singapore 389842
Phone +65 6299 2268
Fax +65 6299 2661
struers.sg@struers.dk

SPAIN
Struers España
Camino Cerro de los Gamos 1
Building 1 - Pozuelo de Alarcón
CP 28224 Madrid
Teléfono +34 917 901 204
Fax +34 917 901 112
struers.es@struers.es

FINLAND
Struers ApS, Suomi
Hietalahdenranta 13
00180 Helsinki
Puhelin +358 (0)207 919 430
Faksi +358 (0)207 919 431
finland@struers.fi

SWEDEN
Struers Sverige
Box 20038
161 02 Bromma
Telefon +46 (0)8 447 53 90
Telefax +46 (0)8 447 53 99
info@struers.se

UNITED KINGDOM
Struers Ltd.
Unit 11 Evolution @ AMP
Whittle Way, Catcliffe
Rotherham S60 5BL
Tel. +44 0845 604 6664
Fax +44 0845 604 6651
info@struers.co.uk

USA
Struers Inc.
24766 Detroit Road
Westlake, OH 44145-1598
Phone +1 440 871 0071
Fax +1 440 871 8188
info@struers.com

TECHNICAL DATA	RepliSet	RepliFix
Viscosity of uncured compound	Very low (F-types) Low (T-types)	High
Detail reproduction	Down to 0.1 µm	Down to 5 µm
Shrinkage	Negligible	Negligible
Tear strength	15-20 kN/m ²	Low
Hardness	30 Shore A	76 Shore A
Temperature range for the surface to be examined	-10°C to + 180°C (14°F to + 356°F)	0°C to + 150°C (32°F to + 302°F)
Life span of the finished replica	Practically indefinite	Practically indefinite

SPECIFICATIONS	Cat.No.	Cat.No.
RepliSet Replication system for non-destructive testing of a microstructure or a 3D structure. Fast curing two-part silicon rubber compound for flexible high-resolution 3D replicas. For the 50 ml system, the hand-operated dispensing gun (40900066) and the static mixing nozzles (40900088) are used in combination with the 50 ml cartridges. For the 265 ml system, the hand-operated dispensing gun (40900065) and the static-mixing nozzles (40900056) are used in combination with the 265 ml cartridges.		
RepliSet-F1 Particularly useful for replicating horizontal or sloping surfaces in low temperature conditions or where rapid results are required. Fluid rapid curing compound with working life of 0.5-1 min. and curing time of 4 min. at 25°C (77°F).		
1 cartridge of 50 ml	40900069	
5 cartridges of 50 ml	40900047	
2 cartridges of 265 ml	40900051	
RepliSet-F5 General-purpose material. Particularly useful for replicating horizontal or sloping surfaces in normal or high temperature conditions. Fluid fast curing compound with working life of 5 min. and curing time of 18 min. at 25°C (77°F).		
1 cartridge of 50 ml	40900068	
5 cartridges of 50 ml	40900046	
2 cartridges of 265 ml	40900050	
RepliSet-T1 Particularly useful for replicating vertical or overhead surfaces in low temperature conditions or where rapid results are required. Thixotropic rapid curing compound with working life of 0.5 - 1 min. and curing time of 4 min. at 25°C (77°F).		
1 cartridge of 50 ml	40900071	
5 cartridges of 50 ml	40900049	
2 cartridges of 265 ml	40900053	
RepliSet-T3 General-purpose material. Particularly useful for replicating vertical or overhead surfaces in normal or high temperature conditions. Thixotropic fast curing compound with working life of 3 min. and curing time of 10 min. at 25°C (77°F).		
1 cartridge of 50 ml	40900070	
5 cartridges of 50 ml	40900048	
2 cartridges of 265 ml	40900052	
RepliSet-GF1 Replication system especially for comparator macroscopy and metrology. Particularly useful for replicating horizontal or sloping surfaces and filling holes. Fluid rapid curing compound with working life of 0.5-1 min. and curing time of 4 min. at 25°C (77°F).		
1 cartridge of 50 ml	40900078	
5 cartridges of 50 ml	40900076	
RepliSet-GT1 Replication system especially for comparator macroscopy and metrology. Particularly useful for replicating vertical or overhead surfaces. Thixotropic rapid curing compound with working life of 0.5-1 min. and curing time of 4 min. at 25°C (77°F).		
1 cartridge of 50 ml	40900079	
5 cartridges of 50 ml	40900077	
RepliFix Specially formulated hand mixed fast curing two-part silicone rubber. Bonds to RepliSet. Particularly useful in combination with RepliSet for producing a rigid backing. It can be used directly for moulding of surface shape for profile measurement.		
RepliFix-2 For low temperature conditions or where rapid results are required. Working life of 2-3 min. and curing time of 10 min. at 25°C (77°F).		40900084
500 g		
RepliFix-20 For high temperature conditions or for taking replicas of complicated geometry or large areas. Working life of 20 min. and curing time of 60 min. at 25°C (77°F).		40900086
500 g		
ACCESSORIES		
Dispensing Gun Hand-operated dispensing gun.		40900066
For 50 ml cartridges		40900065
For 265 ml cartridges		
Static-mixing Nozzles For RepliSet replication compound in 50 ml cartridges, 35 pcs.		40900088
265 ml cartridges, 10 pcs.		40900056
Nozzle Tips For replicating flat surfaces. Fishtail spreaders, 10 mm width. To be mounted on 50 ml static-mixing nozzle (40900088).		40900089
30 pcs.		
For replicating small holes. Luer needle, 1 mm dia., 30 mm long. To be mounted on 50 ml static-mixing nozzle (40900088).		40900060
10 pcs.		
For replicating larger holes. Flexible hose, 6 mm dia., 100 mm long. To be mounted on 50 ml static-mixing nozzle (40900088)		40900061
10 pcs.		
Backing Slides A flexible plastic slide, which bonds to the replica and ensures a flat back to the replica. For levelling of replicas to assist microscopic examination, as dimensional support for metrology and for well-ordered labelling, transport and storage of RepliSet replicas.		40900087
26 x 76 x 1 mm. 50 pcs.		
Backing Paper Bonds to the replica and facilitates labelling, handling and the levelling of replicas to assist microscopic examination.		40900062
60 x 70 mm. 100 pcs.		
A4 (210 x 297 mm). 10 pcs.		40900063
Case for RepliSet 50 ml System Aluminium carrying case with room for all necessities for field applications. The content is ordered separately.		40900067
L x d x h = 445 x 155 x 330 mm		

Struers' products are subject to constant product development.
Therefore, we reserve the right to introduce changes in our products without notice.