

# OPTIMEC<sup>®</sup> METROLOGY

## IMPACT OF TEMPERATURE ON CONTACT LENS MEASUREMENT

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### Introduction

With continual improvements to contact lens manufacture and design, the availability of complex soft specialty lenses continues to grow. The complexity of the available designs is increasing, and soft contact lenses are known to change in size due to changes in temperature (1,2).

Optimec Metrology Limited sell and support a range of metrology instrumentation, which can be temperature controlled using the Optimec [TC20i](#) and Optimec [TSC3](#) temperature control systems.

This report uses a simple study to demonstrate the changes to key parameters that can occur with changes in temperature, illustrating the importance of maintain a consistent temperature for effective metrology.

### Methods

A study was completed with 10 lenses covering a range of sizes and materials, as detailed in Table 1.

Lens Design	Material	Nominal BCOR (mm)	Nominal Diameter (mm)	Power (D)		
Moulded Multifocal	Omafilcon A II 2	8.7	14.2	-10	-3	+6
Moulded Spherical	Stenfilcon A II 4(Sihi)	8.4	14.2	-10	-3	+6
Lathe Cut Sphere	Filcon II 2	8.6	14.5	-3.00		
Lathe Cut MF Toric	Filcon II 2	8.6	14.5	-1.00, -0.50cyl, +4.00ADD		
Lathe Cut Toric	Filcon V 3 (Sihi)	8.6	14.5	-5.00, -1.50cyl		
Lathe Cut Toric	Filcon II 3	8.6	14.5	-17.00, -5.00cyl		

Table 1

The instrument used for the study was the Optimec JCF, capable of measuring BCOR (following ISO18369-3 section 4.2.3) and total lens diameter, connected to an Optimec TC20i to control the temperature of the measurement fluid (Figure 1). For the current study five temperatures were used, 15°C, 20°C, 25°C, 30°C and 35°C.



**Figure 1: The Optimec JCF (top left) Optimec TC20i (top right) and Optimec JCF / TC20i combination (left)**

For the study, all samples were immersed in standard saline for at least 24 hours prior to any measurement.

For each measurement temperature, the following procedure was followed:

1. The samples (in their glass vials) were placed in a water bath at the study temperature for at least 20 minutes prior to being transferred to the wet cell
2. The fluid in the wet cell was maintained at the study temperature  $\pm 0.5^{\circ}\text{C}$
3. The samples were placed into the wet cell and each was measured once.

## Results

For the purposes of the current study 2 parameters will be investigated, Diameter and BCOR.

Figure 2 shows the changes in Diameter with temperature for each sample

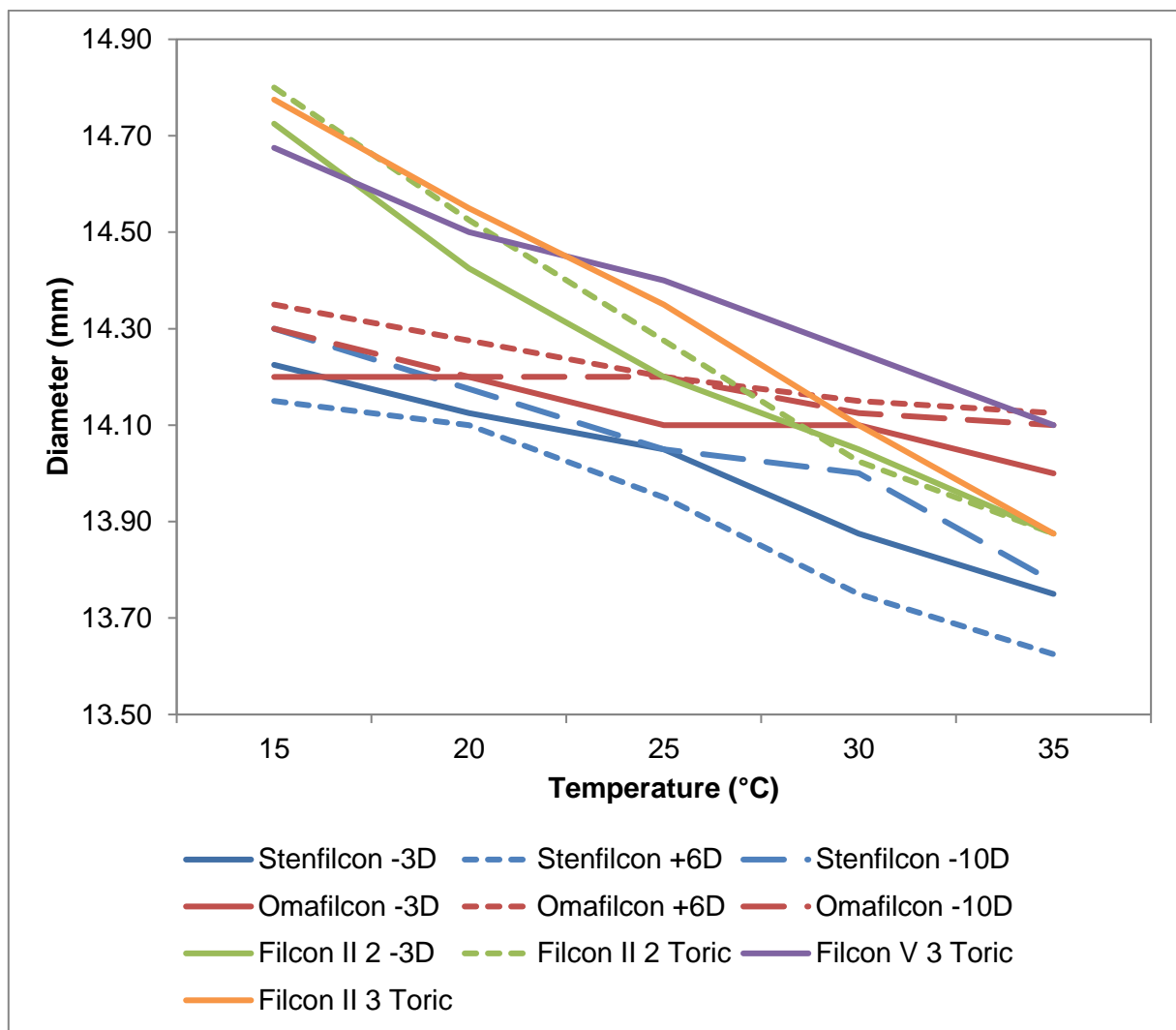


Figure 2: Change in Diameter with Temperature for each sample

Figure 3 shows the changes in BCOR with temperature for each sample

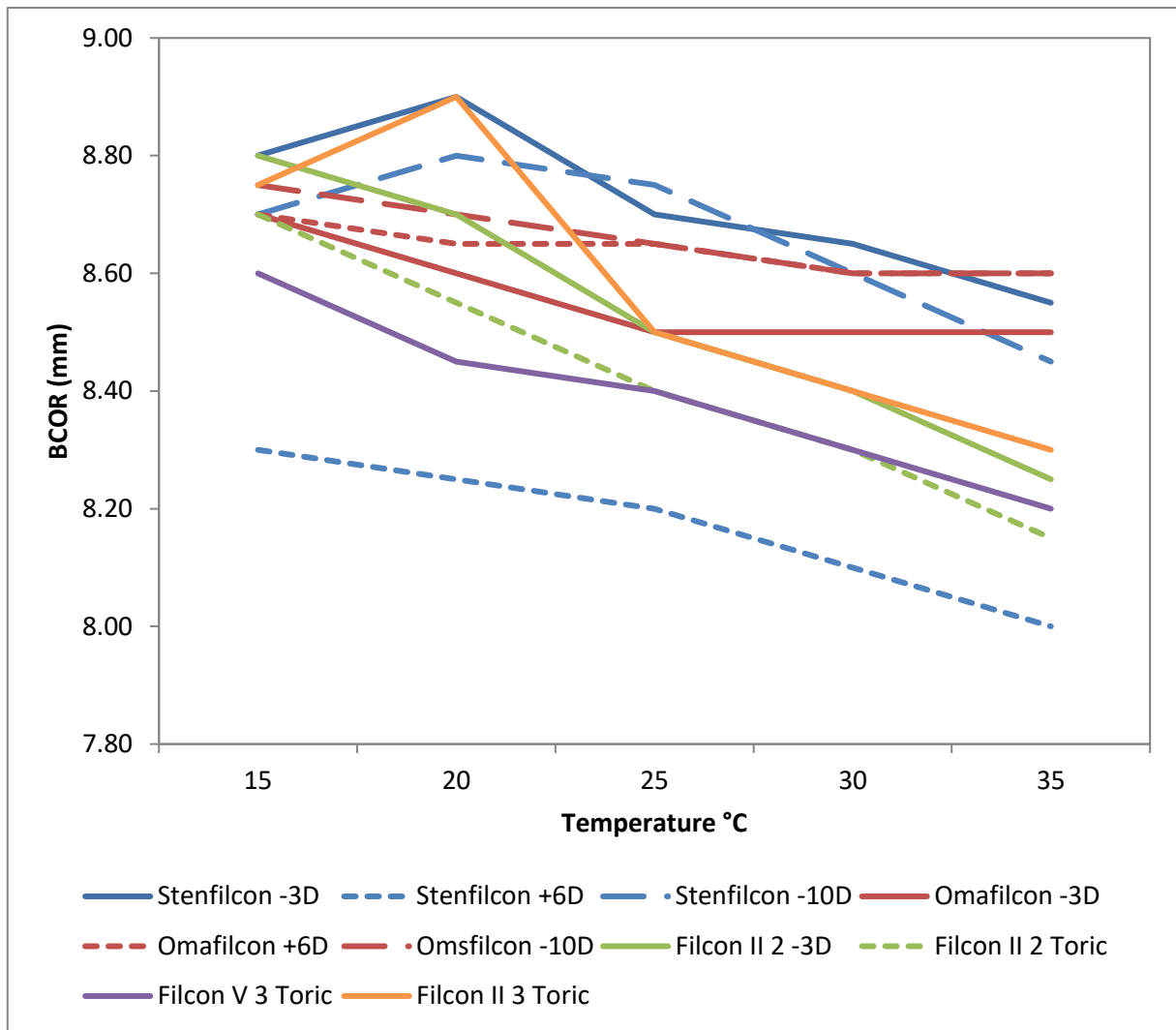


Figure 3: Change in BCOR with Temperature for each sample

Figures 4 and 5 show the changes in parameters grouped by material, with the results of all lenses of each material type averaged.

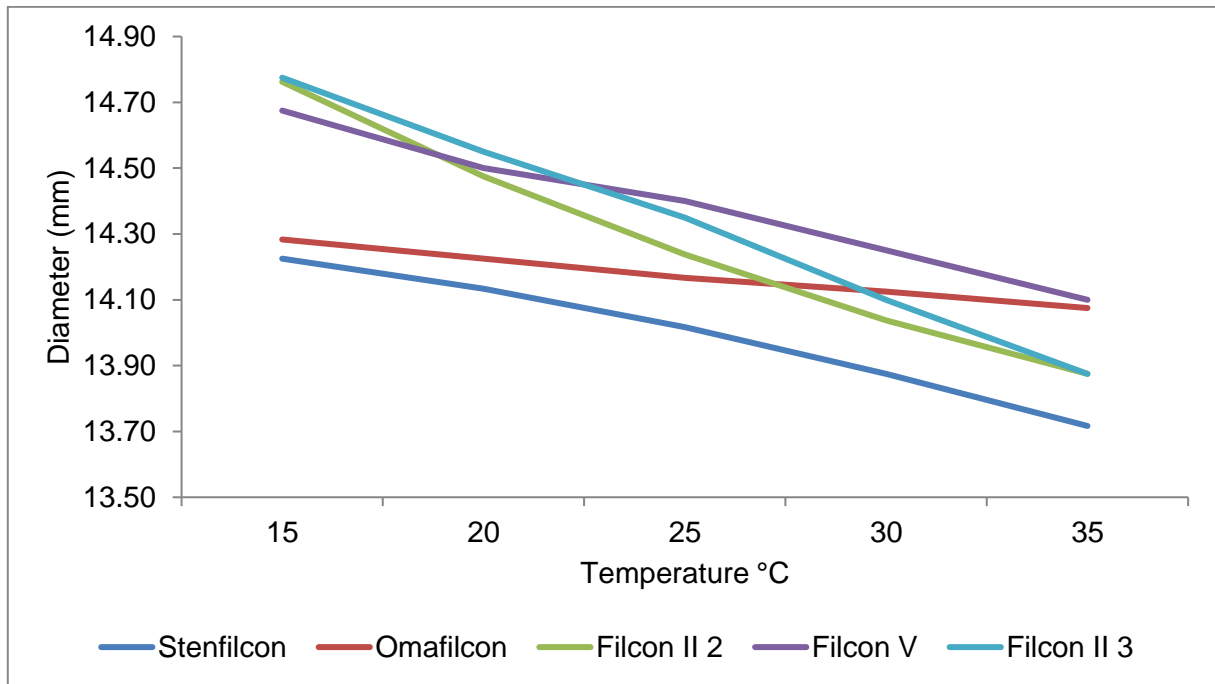


Figure 4: Change in Diameter with Temperature grouped by Material

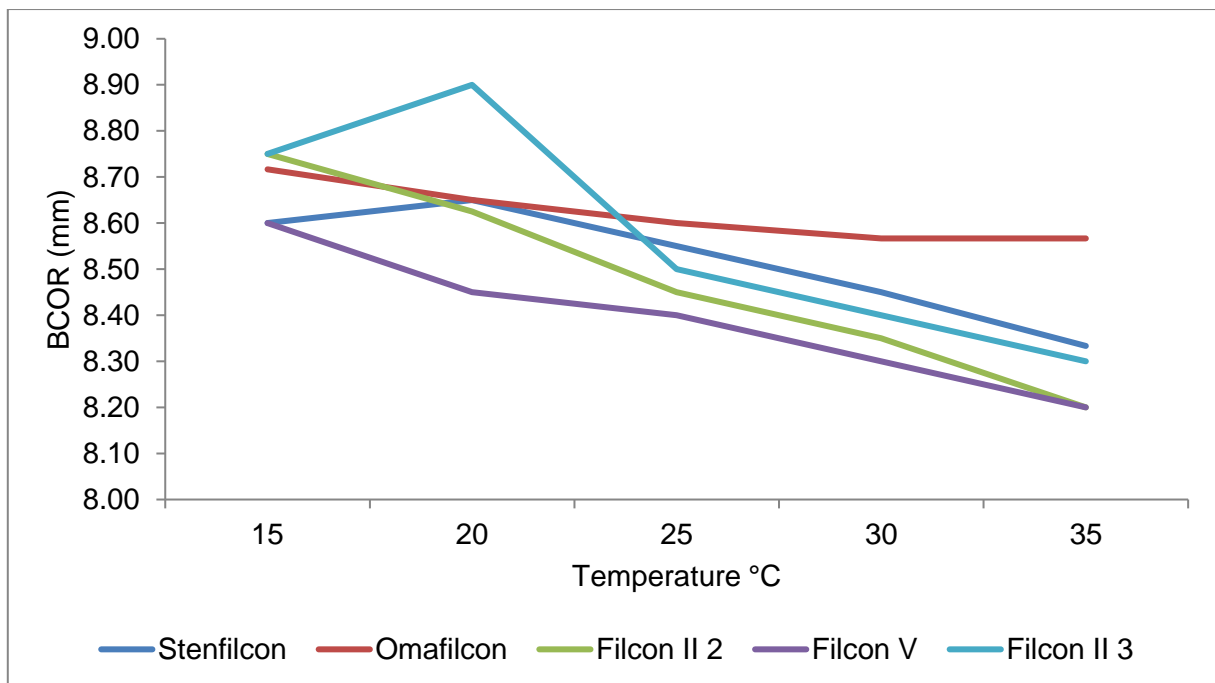


Figure 5: Change in BCOR with Temperature grouped by Material

## Summary

The study shows that both Diameter and BCOR reduce with increasing temperature, suggesting an overall shrinkage of samples, matching the findings of previous studies. The rate of change is different depending on the material choice, but all materials showed a change.

Failure to maintain a controlled temperature of soft contact lenses during measurement, as required by International Standards, can provide results which may lead to acceptance of lenses that are otherwise out of specification, or rejection of lenses that are otherwise within specification.

The report results show the importance of maintaining a controlled temperature, to obtain consistent measurement results, when using metrology instruments for the measurement of soft contact lenses.

For further information please do not hesitate to contact us

[enquiries@optimecmetrology.com](mailto:enquiries@optimecmetrology.com) or visit [www.optimecmetrology.com](http://www.optimecmetrology.com)



*Optimec Metrology Limited, Unit B3, The Haysfield, Spring Lane North,  
Malvern, Worcestershire, United Kingdom WR14 1GF*  
Tel: +44 (0) 1684 892859 Fax: +44 (0) 1684 893037

Web: [www.optimecmetrology.com](http://www.optimecmetrology.com) Email: [optimec@optimecmetrology.com](mailto:optimec@optimecmetrology.com)

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## References

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