

TNE-04: Test report for delivery lots

0. Test report for delivery lots of optical glass

With every delivery of optical glass the customer receives a test report in accordance to DIN EN 10204 – 2.2 as described in chapter 1.3.1 of the optical glass catalogue. The test report contains non-specific test results to confirm the compliance of the delivery with the order. That means that random test samples were inspected during the production to ensure the compliance with the order. The specific choice of test samples and inspection procedures ensures the validity of the results for all parts of the delivery lot even if they were not tested individually.

1. Compilation of delivery lots

Delivery lots are compiled according to their refractive index and Abbe number specification. The maximum scattering of the refractive index within a lot is $\pm 1 \times 10^{-4}$ (pressings: $\pm 2 \times 10^{-4}$). In general the delivery lot contains adjacent batches taken from a single production run. If not enough material is available from a single production run SCHOTT will add material from other production runs that fit to the optical position within the same delivery lot.

2. Marking of the delivery lot and batches

The Lot-ID number is assigned automatically by the computer system and is unrelated to any production information. A new Lot-ID is assigned for each delivery and only related to the delivered lot. The delivery lot contains batches, which are the smallest administrated units of materials administration. Batches are marked by the production serial number, e.g. C100001234. A batch of block glass for further cold processing contains a single glass block. In the case of processed glass 100 single glass discs could also be a batch.

3. Details in the test report

The test report (see example on the next page) contains the Lot-ID, the order number, the SCHOTT customer number, the glass type, the refractive index and Abbe number steps according order, the scattering tolerance of refractive index, a list of all batches of the delivery lot, details on the central optical position of the delivery lot between the maximum and the minimum value of refractive index and Abbe number in the lot. The difference of the refractive index and the Abbe number from the catalogue values the spectral internal transmission at a wavelength of 400 nm and a sample thickness of 25 mm.

The refractive index and the Abbe number of the d-line are based on measurements. All other values were calculated with the use of the relative dispersions values of the glass given in the catalogue.

Example of test report (subject to change)

| | |
|--|-----------------------------------|
| SCHOTT | |
| Test Report / Werkszeugnis 10.12.2001 | |
| DIN EN 10204-2.2 | |
| Delivery Note / Lot-Id. / Lieferschein / Lieferlos | 80003801 00010 03.11.2001 |
| Order Position of / Auftrag Position vom | 3819 000010 03.11.2001 |
| Customer / Kunde | 5005098 |
| Glass Type / Glasart | N-BK7 |
| n_d/n_d - Step / - Stufe | 1 / 1 |
| Scattering / Streuung | ± 0,00010 |
| Batches / Chargen | |
| A1001234 A1001235 A1001237 A1001240 A1001410 A1001412 A1001413 | |
| A1001414 A1001415 A1001416 A1001420 A1001421 A1001422 A1001424 | |
| A1002891 A1002892 A1002894 | |
| n_d | 1,51661 -0,00019 v_d 64,29 0,12 |
| n_e | 1,51853 -0,00019 v_e 64,08 0,12 |
| | n_F-n_C 0,00804 |
| | n_d-n_C 0,00247 |
| | n_F-n_d 0,00556 |
| | n_F-n_e 0,00365 |
| | n_g-n_F 0,00430 |
| | n_F-n_C' 0,00809 |
| | n_F-n_e 0,00410 |
| $\tau_i(400nm;25mm)$ | 0,990 |
| This test report is printed with EDP. It is valid without signature. Dieses Werkszeugnis ist per EDV ausgedruckt und ohne Unterschrift gültig | |
| SCHOTT GLAS Optics Division / Geschäftsbereich Optik | |
| QFQ001DA | |

4. Annealing state of the delivery lot

The described test reports are related to delivery lots of glass for cold processing purpose. That means that the glass was fine annealed and it is assumed that no additional heat treatment of the glass with temperatures near T_g will be applied during further processing (please refer to the T_g value in the catalogue data sheet). In general the delivery lot will not be compiled of glass with homogeneous annealing rate history. Therefore even in the case of correct fine annealing additional heat treatment might lead to greater scattering of refractive index than promised in the test report.

The given limit values for the stress birefringence will be kept even for delivery lots with inhomogeneous history of annealing rates.

Delivery lots of glasses for reheat pressing do have homogeneous annealing rates. All of these lots come with an annealing schedule as certificate. The certificate contains values of the central refractive index and Abbe number of the lot at a given annealing rate and tolerable annealing rates for different refractive index and Abbe number steps. This information is generated with samples whose state of annealing differs from the respective glass. The glass is only coarse annealed. Fine annealing of glass for reheat pressing would be a needless refining step due to the later reheat pressing process. Delivery lots of glass for hot pressing are not necessary suited for the processing of optical components via cold processing (cutting, grinding, polishing). On special demand lots of fine annealed glass also can be delivered with homogeneous annealing rates and additional annealing schedules.

5. Backtracing of material properties and production information of lots

A batch is numbered directly after melting and coarse annealing. The batch number is kept in all further processing steps and therefore allows to backtrace all important material properties and production information.

6. Differences to the former numbering system with melt, block, group and annealing number

The aim of the former numbering system with melt-, block-, group- and annealing-number was the same as the new one: to mark material lots with same properties. Melt- and block-numbers were assigned directly after production like the new batch number. They registered the individual part and the production time section of its production (in general a daily production). The batch number fulfils the same target.

Those parts were graded into lots according to the scattering tolerance for refractive index of $\pm 1 \times 10^{-4}$ directly after fine annealing and arranged into groups. Because of this additional grading and the added annealing number (refers to one oven filling) the material lots could be only smaller than one daily production. In material administration their properties were only representatively used.

The new system based on SAP R/3 allows continuous individual administration of parts. It is possible to put together much bigger lots of glass with same properties for delivery. Therefore unnecessary paperwork will be reduced.

Repeat orders of glass with suitable optical positions for a delivered lot can not be specified by the melt- and annealing number anymore. In the future the delivery lot number or the desired refractive index, Abbe number position needs to be specified.

Glass parts from stocks that were produced before 1.1.2002 will get similar batch numbers that consist of the former melt- and annealing number.

7. Additional test certificates

Further properties of the delivery lot that were requested by the customer will be certified with additional test certificates.

Other test certificates according chapter 1.3.2 „Precision Test Certificates VIS, UV-IR and Super Precision Test Certificates VIS“ of our catalogue are not affected by the new rules and will be offered as usual.

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