

Optical Coatings: Standardization on DIN and ISO-Level

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A short overview over the development of the standardization of optical coatings is described.

Standardisation in the field of optical coatings began in the seventies of the past century. Especially anti reflecting layers and hereby not only single layers but also multi layer films had become state of the art for spectacle lenses and for application in optical instruments, too. Therefore it became necessary to lay down exact formulations and definitions of terms as valid for producers as for customers in the same way as it has been done in other technical fields. Internal some optical manufactures had realised such specifications you could find on optical drawings for example.

In the 70's at German national level DIN/NAFuO a committee "Optical Coatings" consisting of specialists and engineers in thin films of the members of NAFuO, Leitz, Rodenstock, Zeiss and others was installed. They aimed at stating definitions of optical coatings, optical properties, minimum requirements and at least test methods for stability, or environmental durability. The common work resulted in a first compilation of standards for optical coatings: DIN 58 195 "Definitions", DIN 58 196 "Test methods" and DIN 58197 "Minimum requirements".

In the following years of the 80's and 90's – the time when I was the chairman of the committee – the progress of technical improvement and refinement made it necessary to elaborate an update of the national standards also in consideration of international use and comparing with British standards and the well known American standards of MIL for example. Especially the minimum requirements in DIN 58 197 were updated . They were described in more detail and were divided into three parts: ar coatings, reflective coatings and beam splitter coatings. Also the standard DIN 58 196 "Test methods" got new action items for abrasion and adhesion – as you can see in the overhead picture as outlined . The standards should also be for civil applications as an alternative to the MIL specifications. (Some times it had been a bit difficult to get the technical equipment like rubber or tapes etc.from the USA). To sum up and what I will say up till now it is very difficult to get criterions for the properties of thin

films like hardness, adhesion, durability etc. from the point of view of exact scientific verifications. In our committee we made a lot of experiments amongst the participating members but without a real success.

The latest result of the working group is a standard DIN 58 197 Part 4 "Minimum requirements on coatings for Laser applications". –

On international level activities on standardisation started in the 80's. Within ISO, Technical Committee 172, Subcommittee 3 a working group "Optical Coatings" was installed. It began to elaborate definitions, terms and specifications for optical layers. In 1994 the work resulted in the formulation of ISO 9211 Part 1 to 4. It has been important that the WG agreed to the basic definitions of optical coatings by their primary optical function., i.e. anti reflecting coatings, reflective films, beam splitter, filtering function etc. The picture (shown on the overhead projector) completely shows the "Table 1" of the standard 9211 – part 1 with all functions. Up till now there are discussions about the function of filtering, because the definition is too general and comprises all kinds of filters as edge filters, band pass filters, short and long wavelength filters. It is very difficult, to describe these filters in view of their optical transmission and reflection respectively.-

Further more the WG decided in accordance with other working groups that the symbol for optical coatings will be a circle and inside the Greek letter for lambda in optical drawings.

In the mean time the standard 9211 has been renewed without remarkable changes. Subsequently ISO standards got more important in the global market. Therefore the standards have been translated in German language and named as DIN ISO 9211- 1, -2, -3, and –4 (just in work) as you see listed in the overhead picture. In future they will replace the former DIN standards as outlined above.