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Optics and photonics — Electronic exchange of optical data —

Part 2: Mapping to the classes and properties defined in ISO 23584

Optique et photonique — Transfert électronique des données optiques —

Partie 2: Mappage des classes et propriétés definies dans l'ISO 23584

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 25297-2 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 1, *Fundamental standards*.

ISO 25297 consists of the following parts, under the general title *Optics and photonics — Electronic exchange of optical data*:

— *Part 1: NODIF information model*

— *Part 2: Mapping to the classes and properties defined in ISO 23584*

Optics and photonics — Electronic exchange of optical data —

Part 2:
Mapping to the classes and properties defined in ISO 23584

1 Scope

This International Standard specifies the relationship between the terms used in ISO 25297-1 and the properties defined in ISO 23584-2, and provides the means to facilitate the use of both standards.

NOTE This International Standard does not define all attributes of properties in ISO 23584-2.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 25297-1:2010, *Optics and photonics — Electronic exchange of optical data — Part 1: NODIF information model*

ISO 23584-1, *Optics and photonics — Specification of reference dictionary — Part 1: General overview on organization and structure*

ISO 13584-42, *Industrial automation systems and integration — Parts library — Part 42: Description methodology: Methodology for structuring parts families*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 25297-1, ISO 23584-1 and ISO 13584-42 apply.

4 Mapping

4.1 General

The terms of the application objects and their attributes in NODIF are used as the preferred names in the reference dictionary.

Underscores used in the terms in NODIF are omitted in the reference dictionary.

NOTE The reference dictionary ID numbers given for the keywords will be filled once they are registered in the ISO/TC 172 reference dictionary database, which is under construction.

4.2 Mapping table

Table 1 and Table 2 show the relationship between keywords in NODIF and the classes and properties in the ISO/TC 172 reference dictionary. Class hierarchy is depicted in Annex A for reference.

Table 1 — Mapping of the terms of classes in NODIF to the reference dictionary

NODIF keyword	Hierarchy	Super class	Preferred name	Definition	Note	Reference dictionary ID number
aperture	Application class	ISO TC172SC1/NODIF	aperture	application object to describe aperture of optical system	4.3.25.6, 4.3.26.8 aperture in NODIF	—
Assembly_tolerance	Application class	ISO TC172SC1/NODIF	assembly tolerance	application object to specify assembly tolerance	4.3.18 Assembly_tolerance in NODIF	—
Diffractive_surface_description	Application class	ISO TC172SC1/NODIF	diffractive surface description	application object to describe diffractive optical surface	4.3.12 Diffractive_surface_description in NODIF	AAA017-001
Dimensional_tolerance	Application class	ISO TC172SC1/NODIF	dimensional tolerance	application object to specify tolerance for dimensions of optical part	4.3.17 Dimensional_tolerance in NODIF	—
Material_property	Application class	ISO TC172SC1/NODIF	material property	application object to specify material	4.3.36 Material_property in NODIF	—
Optical_design_formulation	Application class	ISO TC172SC1/NODIF	optical design formulation	application object to collect information relevant to optical design	4.3.5 Optical_design_formulation in NODIF	—
Optical_evaluation	Application class	ISO TC172SC1/NODIF	optical evaluation	application object to describe conditions and results of optical evaluations	4.3.23 Optical_evaluation in NODIF	—
Optical_part_view_designator	Application class	ISO TC172SC1/NODIF	optical part view designator	application object to link information on optical systems/parts and the object “design discipline product definition” in ISO 10303-203	4.3.2 Optical_part_view_designator in NODIF	—
Optical_process_specification	Application class	ISO TC172SC1/NODIF	optical process specification	application object to describe machining process	4.3.15 Optical_process_specification in NODIF	—
Optical_specification	Application class	ISO TC172SC1/NODIF	optical specification	application object to contain various specifications	4.3.13 Optical_specification in NODIF	—
Optical_system_specification	Application class	ISO TC172SC1/NODIF	optical system specification	application object to contain specifications of optical system	4.3.4 Optical_system_specification in NODIF	—
Optical_tolerance	Application class	ISO TC172SC1/NODIF	optical tolerance	application object to describe optical tolerance	4.3.16 Optical_tolerance in NODIF	—
Other_optical_evaluation	Application class	ISO TC172SC1/NODIF	other optical evaluation	application object to describe optical evaluation based on external definition	4.3.31 Other_optical_evaluation in NODIF	—
paraxial_ray_tracing	Application class	ISO TC172SC1/NODIF	paraxial ray tracing	application object to describe paraxial ray tracing results	4.3.24.6 paraxial_ray_tracing in NODIF	—

Table 1 (*continued*)

NODIF keyword	Hierarchy	Super class	Preferred name	Definition	Note	Reference dictionary ID number
ray_tracing	Application class	ISO TC172SC1/NODIF	ray tracing	application object to describe real ray tracing results	4.3.25.10 ray_tracing in NODIF	—
Specification_distinction	Application class	ISO TC172SC1/NODIF	specification distinction	application object to indicate type of optical design specification; official specification requirements of optical system or design requirements for optical system	4.3.3 Specification_distinction in NODIF	—
wavelength	Application class	ISO TC172SC1/NODIF	wavelength	application object to specify wavelength value or spectral line	4.3.14.5.2, 4.3.24.2, 4.3.25.5, 4.3.14.5.2, 4.3.28.2 wavelength in NODIF	—
Zone	Application class	ISO TC172SC1/NODIF	zone	application object to specify optically effective area	4.3.19 Zone in NODIF	—
zone_form	Application class	ISO TC172SC1/NODIF	zone form	application object to describe optically effective elementary area	4.3.19.2 zone_form in NODIF	—
three-dimensional_real_vector	Application class	ISO TC172SC1/NODIF	three-dimensional real vector	data type of component consisting of three elements; vector component or direction cosine	Figure A.6, Figure A.20 three-dimensional_real_vector in NODIF	—
other_tolerance	Application class	dimensional tolerance	other tolerance	application object to describe tolerance for optical part based on external definition	4.3.17.5 other_tolerance in NODIF	—
change_position	Application class	multi-configuration	change position	application object to specify arrangement of dynamic blocks in optical system	4.3.8.13 change_position in NODIF	—
Block_description	Application class	optical design formulation	block description	application object to describe moving range of optical block	4.3.6 Block_description in NODIF	—
Cemented_part	Application class	optical design formulation	cemented part	application object to indicate cemented optical part	4.3.7 Cemented_part in NODIF	—
Optical_path_definition	Application class	optical design formulation	optical path definition	application object to specify data necessary to trace rays through optical system	4.3.8 Optical_path_definition in NODIF	—
Ghost_image_evaluation	Application class	optical evaluation	ghost image evaluation	application object to describe ghost image evaluation	4.3.29 Ghost_image_evaluation in NODIF	—
Illuminance_distribution _evaluation	Application class	optical evaluation	illuminance distribution evaluation	application object to describe illuminance distribution evaluation	4.3.27 Illuminance_distribution_evaluation in NODIF	—

Table 1 (*continued*)

NODIF keyword	Hierarchy	Super class	Preferred name	Definition	Note	Reference dictionary ID number
Optical_sensitivity_evaluation	Application class	optical evaluation	optical sensitivity evaluation	application object to describe optical sensitivity evaluation	4.3.30 Optical_sensitivity_evaluation in NODIF	—
OTF_evaluation	Application class	optical evaluation	OTF evaluation	application object to specify optical evaluation based on OTF	4.3.26 OTF_evaluation in NODIF	—
Paraxial_evaluation	Application class	optical evaluation	paraxial evaluation	application object to describe optical evaluation by paraxial ray tracing	4.3.24 Paraxial_evaluation in NODIF	—
Ray_tracing_evaluation	Application class	optical evaluation	ray tracing evaluation	application object to describe optical evaluation by real ray tracing	4.3.25 Ray_tracing_evaluation in NODIF	—
Spectral_characteristics	Application class	optical evaluation	spectral characteristics	application object to describe spectral characteristics	4.3.28 Spectral_characteristics in NODIF	—
surface_imperfection_evaluation	Application class	optical evaluation	surface imperfection evaluation	application object to describe surface imperfection evaluation	4.3.31 surface_imperfection_evaluation in NODIF	—
veiling_glare_index_evaluation	Application class	optical evaluation	veiling glare index evaluation	application object to describe veiling glare index evaluation	4.3.32 veiling_glare_index_evaluation in NODIF	—
internal_transmittance	Application class	optical material specification	internal transmittance	application object to indicate internal transmittance of optical material	4.3.14.8 internal_transmittance in NODIF	—
refractive_index_information	Application class	optical material specification	refractive index information	application object to describe refractive index values and relevant wavelength values of material	4.3.14.5 refractive_index_information in NODIF	—
multi-configuration	Application class	optical path definition	multi-configuration	application object to specify information on multiple configurations in optical system	4.3.8.11 multi-configuration in NODIF	—
non-sequential_path_range	Application class	optical path definition	non-sequential path range	application object to specify range of non-sequential path	4.3.8.6 non-sequential_path_range in NODIF	—
Surface_interface	Application class	optical path definition	surface interface	application object to specify data for ray tracing at each interface	4.3.9 Surface_interface in NODIF	—
Coating_specification	Application class	optical specification	coating specification	application object to describe optical coating	4.3.20 Coating_specification in NODIF	—
Optical_material_specification	Application class	optical specification	optical material specification	application object to contain specification of optical material	4.3.14 Optical_material_specification in NODIF	—

Table 1 (*concluded*)

NODIF keyword	Hierarchy	Super class	Preferred name	Definition	Note	Reference dictionary ID number
Protective_surface_treatment	Application class	optical specification	protective surface treatment	application object to describe treatment process onto optical surface; black painting to prevent stray light or protect optical part	4.3.21 Protective_surface_treatment in NODIF	—
User-defined_specification	Application class	optical specification	user-defined specification	application object to specify item based on external definition	4.3.22 User-defined_specification in NODIF	—
aspheric_coefficient	Application class	optical surface description	aspheric coefficient	application object to describe coefficient of power series in polynomial terms of generalized aspheric surface when surface is rotationally symmetric about z-axis	4.3.11.3.11 aspheric_coefficient in NODIF	—
user-defined_surface_coefficient	Application class	optical surface description	user-defined surface coefficient	application object to specify name and value of coefficient for “user-defined surface”	4.3.11.3.18 user-defined_surface_coefficient in NODIF	—
user-defined_surface_reference	Application class	optical surface description	user-defined surface reference	application object to specify external file reference to contain expression based on external definition	4.3.11.3.17 user-defined_surface_reference in NODIF	—
surface_form_tolerance	Application class	optical tolerance	surface form tolerance	application object to describe tolerance for optical surface form	4.3.16.5 surface_form_tolerance in NODIF	—
aberration	Application class	ray tracing evaluation	aberration	application object to specify ray aberration collection based on real ray tracing	4.3.25.11 aberration in NODIF	—
Optical_surface_description	Application class	surface interface	optical surface description	application object to indicate mathematical expression of optical surface form	4.3.11 Optical_surface_description in NODIF	—
Surface_position	Application class	surface interface	surface position	application object to indicate position of optical surface defined by surface distance or local coordinate	4.3.10 Surface_position in NODIF	—
local_coordinate_transformation	Application class	surface position	local coordinate transformation	data type to specify the origin of local coordinate system and coordinate transformation to locate optical surface	4.3.10.3 local_coordinate_transformation in NODIF	—

Table 2 — Mapping of the terms of properties in NODIF to the reference dictionary

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
wavelength	Properties	ISO TC172 SC1/NODIF	wavelength	data type to describe a set of wavelengths	4.3.14.8.2, 4.3.14.5.2, 4.3.24.2, 4.3.25.5, 4.3.26.3, 4.3.28.2, wavelength in NODIF; visible property	—	wavelength	—
coma	Properties	aberration	coma	coma in aberration	4.3.25.11.3 coma in NODIF	mm	REAL	—
distortion	Properties	aberration	distortion	distortion of image	4.3.25.11.6 distortion in NODIF	%	REAL	—
radial_image_position	Properties	aberration	radial image position	radial image position when astigmatism exists	4.3.25.11.4 radial_image_position in NODIF	mm	REAL	—
spherical_aberration	Properties	aberration	spherical aberration	longitudinal spherical aberration	4.3.25.11.2 spherical_aberration in NODIF	mm	REAL	—
tangential_image_position	Properties	aberration	tangential image position	tangential image position when astigmatism exists	4.3.25.11.5 tangential_image_position in NODIF	mm	REAL	—
wavefront_aberration	Properties	aberration	wavefront aberration	aberration based on optical path difference	4.3.25.11.7 wavefront_aberration in NODIF	1 (wave-length)	REAL	—
aperture_type	Properties	aperture	aperture type	code to specify aperture; F-number, NA, entrance pupil diameter or aperture angle	4.3.25.6.2 aperture_type in NODIF		STRING	—
aperture_value	Properties	aperture	aperture value	value of aperture according to “aperture type”	4.3.25.6.3 aperture_value in NODIF		REAL	—
aspheric_coefficient_order	Properties	aspheric coefficient	aspheric coefficient order	order of power series in polynomial terms of generalized aspheric surface	Figure A.8 aspheric_coefficient_order in NODIF		INTEGER	—
aspheric_coefficient_value	Properties	aspheric coefficient	aspheric coefficient value	value of aspheric coefficient	Figure A.8 aspheric_coefficient_value in NODIF		REAL	—
centring_tolerance	Properties	assembly tolerance	assembling centring tolerance	tolerance for centring of optical part or block in assembling optical system	4.3.18.3 centring_tolerance in NODIF		STRING	—
separation_tolerance	Properties	assembly tolerance	separation tolerance	tolerance for axial separation between optical parts or blocks in assembling optical system	4.3.18.2 separation_tolerance in NODIF	mm	REAL	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
block_first_surface	Properties	block description	block first surface	the number of first surface of optical block	4.3.6.3 block_first_surface in NODIF		INTEGER	—
block_last_surface	Properties	block description	block last surface	the number of last surface of optical block	4.3.6.4 block_last_surface in NODIF		INTEGER	—
block_purpose	Properties	block description	block purpose	information on application purpose of optical block	4.3.6.2 block_purpose in NODIF		STRING	—
optical_adhesive	Properties	cemented part	optical adhesive	optical adhesive to cement optical elements	4.3.7.3 optical_adhesive in NODIF		STRING	—
optical_element	Properties	cemented part	optical element	optical elements to be cemented	4.3.7.2 optical_element in NODIF		STRING	—
applied_surface_position	Properties	change position	applied surface position	data type of surface position of dynamic block after position change	4.3.8.13.3 applied_surface_position in NODIF	—	surface position	—
surface_interface_change_designator	Properties	change position	surface interface change designator	the number of surface to designate first surface of dynamic block	4.3.8.13.2 surface_interface_change_designator in NODIF		INTEGER	—
coating_characteristics	Properties	coating specification	coating characteristics	coating specification; layer composition and designed or measured values for reflectance and transmittance	4.3.20.4 coating_characteristics in NODIF		STRING	—
coating_name	Properties	coating specification	coating name	name of coating to be applied onto optical surface	4.3.20.2 coating_name in NODIF		STRING	—
coating_type	Properties	coating specification	coating type	type of optical coating	4.3.20.3 coating_type in NODIF		STRING	—
coating_zone	Properties	coating specification	coating zone	area to apply coating onto optical surface	4.3.20.5 coating_zone in NODIF		STRING	—
construction_wavelength	Properties	diffractive surface description	construction wavelength	wavelength value to calculate optical path difference caused by phase factor of diffractive element	4.3.12.4 construction_wavelength in NODIF	nm	REAL	—
diffraction_order	Properties	diffractive surface description	diffraction order	diffractive order of diffractive surface	4.3.12.3 diffraction_order in NODIF		INTEGER	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
diffractive_surface_type	Properties	diffractive surface description	diffractive surface type	type of diffractive element	4.3.12.2 diffractive_surface_type in NODIF		STRING	—
phase_term_coefficient	Properties	diffractive surface description	phase term coefficient	coefficient's name and value of phase term of a diffractive element	4.3.12.6 phase_term_coefficient in NODIF		STRING	—
phase_term_type	Properties	diffractive surface description	phase term type	type of phase term when diffractive surface is given by phase function	4.3.12.5 phase_term_type in NODIF		STRING	—
diameter_tolerance	Properties	dimensional tolerance	diameter tolerance	tolerance for diameter of optical part	4.3.17.4 diameter_tolerance in NODIF; indications follow ISO 10110-1	mm	REAL	—
radius_tolerance	Properties	dimensional tolerance	radius tolerance	tolerance for radius of curvature of optical surface	4.3.17.2 radius_tolerance in NODIF; indications follow ISO 10110-1	mm	REAL	—
thickness_tolerance	Properties	dimensional tolerance	thickness tolerance	tolerance for centre thickness of optical part	4.3.17.3 thickness_tolerance in NODIF; indications follow ISO 10110-1	mm	REAL	—
ghost_result	Properties	ghost image evaluation	ghost result	results of ghost image evaluation	4.3.29.6 ghost_result in NODIF		STRING	—
light_source_intensity	Properties	ghost image evaluation	light source intensity	intensity of light source	4.3.29.4 light_source_intensity in NODIF	1 (ratio)	REAL	—
light_source_location	Properties	ghost image evaluation	light source location	positions of light source	4.3.29.2 light_source_location in NODIF		STRING	—
light_source_spectra	Properties	ghost image evaluation	light source spectra	spectrum distribution of light source	4.3.29.3 light_source_spectra in NODIF		STRING	—
optical_surface _combination	Properties	ghost image evaluation	optical surface combination	pairs of optical surfaces which generate ghost images	4.3.29.5 optical_surface_combination in NODIF		INTEGER	—
illuminance_distribution	Properties	illuminance distribution evaluation	illuminance distribution	information resulted from illuminance distribution evaluation	4.3.27.2 illuminance_distribution in NODIF		STRING	—
piece_thickness	Properties	internal transmittance	piece thickness	thickness of optical material piece whose transmittance is measured	4.3.14.8.4 piece_thickness in NODIF	mm	REAL	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
transmittance	Properties	internal transmittance	transmittance	internal transmittance of optical material	4.3.14.8.3 transmittance in NODIF		REAL	AAA076-001
linear_expansion _coefficient	Properties	material property	linear expansion coefficient	coefficient of linear expansion of material caused by heat	4.3.36.5 linear_expansion_coefficient in NODIF	1/K	REAL	—
Poisson's_ratio	Properties	material property	Poisson's ratio	ratio of relative contraction strain	4.3.36.3 Poisson's_ratio in NODIF	1 (ratio)	REAL	—
specific_gravity	Properties	material property	specific gravity	ratio of density of optical material to density of water	4.3.36.4 specific_gravity in NODIF	1 (ratio)	REAL	—
specific_heat	Properties	material property	specific heat	heat energy required to increase temperature by 1 kelvin of 1 kg material	4.3.36.7 specific_heat in NODIF	J/(kgK)	REAL	—
thermal_conductivity	Properties	material property	thermal conductivity	capacity to conduct heat	4.3.36.6 thermal_conductivity in NODIF	W/(mK)	REAL	—
Young's_modulus	Properties	material property	Young's modulus	modulus of elasticity	4.3.36.2 Young's_modulus in NODIF	Giga-pascal	REAL	—
multi-configuration_comment	Properties	multi-configuration	multi-configuration comment	information to represent supplementary explanation of configuration	4.3.8.12 multi-configuration_comment in NODIF		STRING	—
non-sequential_path_entrance	Properties	non-sequential path range	non-sequential path entrance	the number of surface to designate entrance optical surface in non-sequential path	4.3.8.7 non-sequential_path_entrance in NODIF		INTEGER	—
non-sequential_path_exit	Properties	non-sequential path range	non-sequential path exit	the number of surface to designate exit optical surface in non-sequential path	4.3.8.8 non-sequential_path_exit in NODIF		INTEGER	—
optical_design_addition	Properties	optical design formulation	optical design addition	name of external file reference to contain documents and drawings associated with optical design	4.3.5.4 optical_design_addition in NODIF		STRING	—
optical_design_code	Properties	optical design formulation	optical design code	code to identify application object, "optical design formulation"	4.3.5.2 optical_design_code in NODIF		STRING	—
optical_design_source	Properties	optical design formulation	optical design source	organization name that is responsible for optical design	4.3.5.3 optical_design_source in NODIF		STRING	—
aperture	Properties	optical evaluation	aperture	data type to specify aperture type and aperture value	4.3.26.8, 4.3.25.6 aperture in NODIF; visible property	—	aperture	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
evaluating_position	Properties	optical evaluation	evaluating position	image position in optical evaluation	4.3.26.13, 4.3.25.9 evaluating_position in NODIF; visible property	mm	REAL	—
field_angle	Properties	optical evaluation	field angle	angle between object direction and optical axis	4.3.26.10, 4.3.25.3 field_angle in NODIF; visible property	degree	REAL	—
object_height	Properties	optical evaluation	object height	height of object point from optical axis	4.3.26.11, 4.3.25.4 object_height in NODIF; visible property	mm	REAL	—
object_position	Properties	optical evaluation	object position	object distance on optical axis	4.3.26.9, 4.3.25.2 object_position in NODIF; visible property	mm	REAL	—
optical_evaluation _addition	Properties	optical evaluation	optical evaluation addition	name of external file reference to contain documents and drawings associated with optical evaluation	4.3.23.4 optical_evaluation_addition in NODIF		STRING	—
optical_evaluation_code	Properties	optical evaluation	optical evaluation code	code to identify optical evaluation	4.3.23.2 optical_evaluation_code in NODIF		STRING	—
optical_evaluation_source	Properties	optical evaluation	optical evaluation source	organization that is responsible for optical evaluation	4.3.23.3 optical_evaluation_source in NODIF		STRING	—
Abbe_number	Properties	optical material specification	Abbe number	constant of Abbe number	4.3.14.7 Abbe_number in NODIF		REAL	AAA036-001
catalogue_name	Properties	optical material specification	catalogue name	name of referenced catalogue of optical material	4.3.14.6.2 catalogue_name in NODIF		STRING	—
catalogue_version	Properties	optical material specification	catalogue version	version of referenced catalogue of optical material	4.3.14.6.4 catalogue_version in NODIF		STRING	—
date_of_issue	Properties	optical material specification	date of issue	publication date of referenced catalogue of optical material	4.3.14.6.3 date_of_issue in NODIF		STRING	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
laser_irradiation_damage_threshold	Properties	optical material specification	laser irradiation damage threshold	damage threshold to material caused by laser irradiation	4.3.14.9 laser_irradiation_damage_threshold in NODIF; indications follow ISO 10110-17		STRING	—
lot_identification	Properties	optical material specification	lot identification	lot identifier of material produced at the same time	4.3.14.4 lot_identification in NODIF		STRING	—
maker_name	Properties	optical material specification	maker name	company name of manufacturer of material	4.3.14.2 maker_name in NODIF		STRING	—
material_name	Properties	optical material specification	material name	name of material	4.3.14.3 material_name in NODIF		STRING	—
coordinate_system	Properties	optical path definition	coordinate system	coordinate system to specify optical surface form	4.3.8.2 coordinate_system in NODIF		STRING	—
meridional_plane	Properties	optical path definition	meridional plane	plane defined by optical axis and object	4.3.8.4 meridional_plane in NODIF		STRING	—
multiplicity	Properties	optical path definition	multiplicity	the number of multiple configurations	4.3.8.9 multiplicity in NODIF		INTEGER	—
number_of_change_positions	Properties	optical path definition	number of change positions	the number of dynamic blocks in optical system	4.3.8.10 number_of_change_positions in NODIF		INTEGER	—
optical_axis	Properties	optical path definition	optical axis	coordinate axis to specify optical axis	4.3.8.3 optical_axis in NODIF		STRING	—
surface_sequence	Properties	optical path definition	surface sequence	list of numbers to designate order of optical surfaces in ray tracing sequence	4.3.8.5 surface_sequence in NODIF		NUMBER	—
aspheric_surface_machining_method	Properties	optical process specification	aspheric surface machining method	machining method of aspherical surface; polishing, moulding or replicating	4.3.15.3 aspheric_surface_machining_method in NODIF		STRING	—
machinability	Properties	optical process specification	machinability	machinability of optical part, and results based on machining condition analysis	4.3.15.2 machinability in NODIF		STRING	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
change_parameter	Properties	optical sensitivity evaluation	change parameter	identifier of parameter to change in evaluating optical sensitivity	Figure A.22 change_parameter in NODIF		STRING	—
change_value	Properties	optical sensitivity evaluation	change value	value of parameter to change in evaluating optical sensitivity	4.3.30.3 change_value in NODIF		REAL	—
evaluation_item	Properties	optical sensitivity evaluation	evaluation item	item to evaluate optical sensitivity	4.3.30.4 evaluation_item in NODIF		STRING	—
optical_element_parameter	Properties	optical sensitivity evaluation	optical element parameter	parameters of optical elements to evaluate optical sensitivity	4.3.30.2 optical_element_parameter in NODIF		STRING	—
sensitivity_result	Properties	optical sensitivity evaluation	sensitivity result	information resulted from optical sensitivity evaluation	4.3.30.5 sensitivity_result in NODIF		STRING	—
conic_constant	Properties	optical surface description	conic constant	conic constant in rotationally symmetric generalized aspheric surface	4.3.11.3.8 conic_constant in NODIF		REAL	—
conic_parameter_a	Properties	optical surface description	conic parameter a	parameter “a” in conical surface	4.3.11.3.19 conic_parameter_a in NODIF		REAL	—
conic_parameter_b	Properties	optical surface description	conic parameter b	parameter “b” in conical surface	4.3.11.3.20 conic_parameter_b in NODIF		REAL	—
conic_parameter_c	Properties	optical surface description	conic parameter c	parameter “c” in conical surface	4.3.11.3.21 conic_parameter_c in NODIF		REAL	—
curvature	Properties	optical surface description	curvature	curvature of basic surface in ISO 10110-12:2007	4.3.11.3.3 curvature in NODIF	1/mm	REAL	—
defining_curve_variable	Properties	optical surface description	defining curve variable	variable either x or y in expression of cylindrical surface with power series or defining curve	4.3.11.3.14 defining_curve_variable in NODIF		STRING	—
radius	Properties	optical surface description	radius	radius of curvature of basic surface in ISO 10110-12:2007	4.3.11.3.2 radius in NODIF	mm	REAL	—
rotation_axis	Properties	optical surface description	rotation axis	axis of rotation for defining curve in ISO 10110-12:2007	4.3.11.3.16 rotation_axis in NODIF		STRING	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
rotational_radius	Properties	optical surface description	rotational radius	radius in revolving defining curve in ISO 10110-12:2007	4.3.11.3.15 rotational_radius in NODIF	mm	REAL	—
surface_type	Properties	optical surface description	surface type	code to identify optical surface form	4.3.11.2 surface_type in NODIF		STRING	—
x_aspheric_coefficient	Properties	optical surface description	x aspheric coefficient	coefficient of x power series in polynomial terms of generalized aspheric surface	4.3.11.3.12 x_aspheric_coefficient in NODIF		REAL	—
x_conic_constant	Properties	optical surface description	x conic constant	conic constant in xz-plane in generalized aspheric surface	4.3.11.3.9 x_conic_constant in NODIF		REAL	—
x_curvature	Properties	optical surface description	x curvature	curvature of generalized aspheric surface in xz-plane at z=0	4.3.11.3.5 x_curvature in NODIF	1/mm	REAL	—
x_radius	Properties	optical surface description	x radius	radius of generalized aspheric surface in xz-plane at z=0	4.3.11.3.4 x_radius in NODIF	mm	REAL	—
y_aspheric_coefficient	Properties	optical surface description	y aspheric coefficient	coefficient of y power series in polynomial terms of generalized aspheric surface	4.3.11.3.13 y_aspheric_coefficient in NODIF		REAL	—
y_conic_constant	Properties	optical surface description	y conic constant	conic constant in yz-plane in generalized aspheric surface	4.3.11.3.10 y_conic_constant in NODIF		REAL	—
y_curvature	Properties	optical surface description	y curvature	curvature of generalized aspheric surface in yz-plane at z=0	4.3.11.3.7 y_curvature in NODIF	1/mm	REAL	—
y_radius	Properties	optical surface description	y radius	radius of generalized aspheric surface in yz-plane at z=0	4.3.11.3.6 y_radius in NODIF	mm	REAL	—
literal_specification_data	Properties	optical system specification	literal specification data	data represented by character in specification items	4.3.4.3 literal_specification_data in NODIF		STRING	—
numerical_specification_data	Properties	optical system specification	numerical specification data	data represented by numeric in specification items	4.3.4.4 numerical_specification_data in NODIF		NUMBER	—
specification_item	Properties	optical system specification	specification item	items to be specified for optical system	4.3.4.2 specification_item in NODIF		STRING	—
specification_item_adjective	Properties	optical system specification	specification item adjective	adjective to clarify specification	4.3.4.5 specification_item_adjective in NODIF		STRING	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
specification_unit	Properties	optical system specification	specification unit	accompanying unit for one of numerical specification data	4.3.4.6 specification_unit in NODIF		STRING	—
Abbe_number_tolerance	Properties	optical tolerance	Abbe number tolerance	tolerance for Abbe number	4.3.16.10 Abbe_number_tolerance in NODIF		REAL	—
bubbles_and_inclusions	Properties	optical tolerance	bubbles and inclusions	allowance for bubbles and inclusions of optical element	4.3.16.3 bubbles_and_inclusions in NODIF; indications follow ISO 10110-3		STRING	AAA037-001
centring_tolerance	Properties	optical tolerance	centring tolerance	centring tolerance for optical part	4.3.16.6 centring_tolerance in NODIF; indications follow ISO 10110-6		STRING	—
inhomogeneity_and_striae	Properties	optical tolerance	inhomogeneity and striae	allowance for inhomogeneity and striae of optical element	4.3.16.4 inhomogeneity_and_striae in NODIF; indications follow ISO 10110-4		STRING	AAA042-001
refractive_index_tolerance	Properties	optical tolerance	refractive index tolerance	tolerance for refractive index of optical material	4.3.16.9.2 refractive_index_tolerance in NODIF		REAL	—
stress_birefringence	Properties	optical tolerance	stress birefringence	allowance for stress birefringence of optical element	4.3.16.2 stress_birefringence in NODIF; indications follow ISO 10110-2		STRING	AAA060-001
surface_imperfection_tolerance	Properties	optical tolerance	surface imperfection tolerance	allowance for surface imperfections on optical surface	4.3.16.7 surface_imperfection_tolerance in NODIF; indications follow ISO 10110-7		STRING	AAA087-001
surface_texture	Properties	optical tolerance	surface texture	texture allowance for optical surface	4.3.16.8 surface_texture in NODIF; indications follow ISO 10110-8		STRING	—
defocus_position	Properties	OTF evaluation	defocus position	sampling image positions in defocus	4.3.26.5 defocus_position in NODIF	mm	REAL	—
evaluation_direction	Properties	OTF evaluation	evaluation direction	a pair of orthogonal evaluation directions in OTF calculation	4.3.26.7 evaluation_direction in NODIF		STRING	—
frequency	Properties	OTF evaluation	frequency	sampling spatial frequency	4.3.26.6 frequency in NODIF	1/mm	REAL	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
image_height	Properties	OTF evaluation	image height	height of image point on image plane	4.3.26.12 image_height in NODIF	mm	REAL	—
MTF	Properties	OTF evaluation	MTF	values of modulation transfer function	4.3.26.14 MTF in NODIF	%	REAL	—
number_of_defocus	Properties	OTF evaluation	number of defocus	the number of defocus positions	4.3.26.4 number_of_defocus in NODIF	1 (number)	INTEGER	—
wavelength-weight	Properties	OTF evaluation	wavelength weight	weight assigned to specific wavelength in evaluating polychromatic OTF	4.3.26.3 wavelength-weight in NODIF	1 (ratio)	REAL	—
OTF_computation_method	Properties	OTF evaluation	OTF computation method	classification index of OTF computation method; geometrical optics, FFT or autocorrelation	4.3.26.2 OTF_computation_method in NODIF		STRING	—
evaluation_item	Properties	other optical evaluation	evaluation item	item of optical evaluation based on external definition	4.3.31.2 evaluation_item in NODIF		STRING	—
evaluation_result	Properties	other optical evaluation	evaluation result	results obtained from optical evaluation based on external definition	4.3.31.3 evaluation_result in NODIF		STRING	—
tolerance_item	Properties	other tolerance	tolerance item	item of tolerance other than radius tolerance, thickness tolerance and diameter tolerance	4.3.17.5.2 tolerance_item in NODIF		STRING	—
tolerance_value	Properties	other tolerance	tolerance value	value associated with tolerance item	4.3.17.5.3 tolerance_value in NODIF		REAL	—
angular_magnification	Properties	paraxial evaluation	angular magnification	angular magnification of afocal optical system	4.3.24.4 angular_magnification in NODIF	1 (dimension-less)	REAL	—
back_focal_distance	Properties	paraxial evaluation	back focal distance	distance between last surface and focal point	4.3.24.12 back_focal_distance in NODIF	mm	REAL	—
back_principal_point _position	Properties	paraxial evaluation	back principal point position	position of back principal point of optical system	4.3.24.11 back_principal_point_position in NODIF	mm	REAL	—
entrance_pupil_position	Properties	paraxial evaluation	entrance pupil position	position of entrance pupil of optical system	4.3.24.8 entrance_pupil_position in NODIF	mm	REAL	—
exit_pupil_position	Properties	paraxial evaluation	exit pupil position	position of exit pupil of optical system	4.3.24.9 exit_pupil_position in NODIF	mm	REAL	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
focal_length	Properties	paraxial evaluation	focal length	focal length of optical system	4.3.24.7 focal_length in NODIF	mm	REAL	—
focal-afocal_distinction	Properties	paraxial evaluation	focal-afocal distinction	code to classify focal system or afocal system	4.3.24.3 focal-afocal_distinction in NODIF		STRING	—
front_principal_point _position	Properties	paraxial evaluation	front principal point position	position of front principal point of optical system	4.3.24.10 front_principal_point_position in NODIF	mm	REAL	—
lateral_magnification	Properties	paraxial evaluation	lateral magnification	lateral magnification of optical system in focal system	4.3.24.5 lateral_magnification in NODIF	1 (dimension-less)	REAL	—
angle_of_paraxial_ray	Properties	paraxial ray tracing	angle of paraxial ray	incident angle of paraxial ray on surface	Figure A.19 angle_of_paraxial_ray in NODIF	1 (dimension-less)	REAL	—
height_of_paraxial_ray	Properties	paraxial ray tracing	height of paraxial ray	ray height of paraxial ray on surface	Figure A.19 height_of_paraxial_ray in NODIF	mm	REAL	—
protective_surface _treatment_type	Properties	protective surface treatment	protective surface treatment type	specific code associated with protective surface treatment	4.3.21.2 protective_surface_treatment _type in NODIF		STRING	—
protective_surface _treatment_zone	Properties	protective surface treatment	protective surface treatment zone	data type of specific area to apply protective surface treatment onto optical part	4.3.21.3 protective_surface_treatment _zone in NODIF	—	zone	—
ray_direction	Properties	ray tracing	ray direction	data type of ray direction vector	Figure A.20 ray_direction in NODIF	—	three-dimensional _real_vector	—
ray_position	Properties	ray tracing	ray position	data type of passing point on ray	Figure A.20 ray_position in NODIF	—	three-dimensional _real_vector	—
back_pupil_position	Properties	ray tracing evaluation	back pupil position	position of exit pupil of optical system	4.3.25.8 back_pupil_position in NODIF	mm	REAL	—
front_pupil_position	Properties	ray tracing evaluation	front pupil position	position of entrance pupil of optical system	4.3.25.7 front_pupil_position in NODIF	mm	REAL	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
refractive_index	Properties	refractive index information	refractive index	refractive index of optical material at definite wavelength	4.3.14.5.3 refractive_index in NODIF		REAL	AAA068-001
refractive_index_source	Properties	refractive index information	refractive index source	source of refractive index used to distinguish measurement or catalogue	4.3.14.5.4 refractive_index_source in NODIF		STRING	—
specification_type	Properties	specification distinction	specification type	type to indicate specification requirements, design requirements or measurement results	4.3.3.2 specification_type in NODIF		STRING	—
spectral_transmittance	Properties	spectral characteristics	spectral transmittance	spectral transmittance included in spectral characteristics evaluation	4.3.28 spectral_transmittance in NODIF	%	REAL	—
irregularity	Properties	surface form tolerance	irregularity	irregularity of optical surface form represented with the number of interference fringes	4.3.16.5.3 irregularity in NODIF; indications follow ISO 10110-5:1996	1 (fringe spacing)	STRING	AAA044-001
rms_deviation_type	Properties	surface form tolerance	rms deviation type	type of root mean square deviation of optical surface form	4.3.16.5.5 rms_deviation_type in NODIF; indications follow ISO 10110-5:1996		STRING	—
rotationally_symmetric_irregularity	Properties	surface form tolerance	rotationally symmetric irregularity	rotationally symmetric irregularity of optical surface form represented with the number of interference fringes	4.3.16.5.4 rotationally_symmetric_irregularity in NODIF; indications follow ISO 10110-5:1996	1 (fringe spacing)	STRING	AAA063-001
sagitta_deviation	Properties	surface form tolerance	sagitta deviation	sagitta deviation of optical surface form represented with the number of interference fringes	4.3.16.5.2 sagitta_deviation in NODIF; indications follow ISO 10110-5:1996		STRING	AAA065-001
surface_imperfections	Properties	surface imperfection evaluation	surface imperfections	information resulted from surface imperfection evaluation	4.3.31.2 surface_imperfections in NODIF	—	STRING	—
effective_diameter	Properties	surface interface	effective diameter	optically effective diameter on optical surface	4.3.9.7 effective_diameter in NODIF	mm	REAL	AAA043-001
following_material	Properties	surface interface	following material	material on outgoing side at optical surface in ray tracing sequence	4.3.9.4 following_material in NODIF		STRING	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
optical_surface _identification	Properties	surface interface	optical surface identification	code to identify application object, “optical surface” to link “optical surface description” and “surface position”	4.3.9.2 optical_surface_identification in NODIF		STRING	—
preceding_material	Properties	surface interface	preceding material	material on incident side at optical surface in ray tracing sequence	4.3.9.3 preceding_material in NODIF		STRING	—
transit_direction	Properties	surface interface	transit direction	direction of exit ray at surface; forward or backward	4.3.9.6 transit_direction in NODIF		STRING	—
transit_mode	Properties	surface interface	transit mode	identifier to describe the behaviour of ray at surface; refraction, reflection or total reflection	4.3.9.5 transit_mode in NODIF		STRING	—
surface_distance	Properties	surface position	surface distance	distance between optical surface designated in optical surface identification and succeeding surface	4.3.10.2 surface_distance in NODIF	mm	REAL	—
translation	Properties	surface position	translation	data type of displacement in coordinate transformation	Figure A.6 translation in NODIF	—	three-dimensional _real _vector	—
x_direction	Properties	surface position	x direction	data type of direction cosines of current x-axis in coordinate transformation	Figure A.6 x_direction in NODIF	—	three-dimensional _real _vector	—
y_direction	Properties	surface position	y direction	data type of direction cosines of current y-axis in coordinate transformation	Figure A.6 y_direction in NODIF	—	three-dimensional _real _vector	—
z_direction	Properties	surface position	z direction	data type of direction cosines of current z-axis in coordinate transformation	Figure A.6 z_direction in NODIF	—	three-dimensional _real _vector	—
user-defined_specification _data	Properties	user-defined specification	user-defined specification data	specification data associated with “user-defined specification item”	4.3.22.3 user-defined_specification_data in NODIF		STRING	—

Table 2 (*continued*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
user-defined_specification_item	Properties	user-defined specification	user-defined specification item	item name of externally-defined specification	4.3.22.2 user-defined_specification_item in NODIF		STRING	—
veiling_glare_index	Properties	veiling glare index evaluation	veiling glare index	information resulted from veiling glare index evaluation	4.3.32.2 veiling_glare_index in NODIF	—	STRING	—
spectral_name	Properties	wavelength	spectral name	name of spectral line	Figure A.13 spectral_name in NODIF		STRING	AAA031-001
wavelength_value	Properties	wavelength	wavelength value	value of wavelength	Figure A.13 wavelength_value in NODIF	nm	REAL	—
base_zone	Properties	zone	base zone	inside area of zone	4.3.19.8 base_zone in NODIF	—	zone form	—
exclusive_zone	Properties	zone	exclusive zone	exclusive area in “base zone”	4.3.19.9 exclusive_zone in NODIF	—	zone form	—
B-spline_degree	Properties	zone form	B-spline degree	B-spline degree of B-spline closed curve	4.3.19.10.10 B-spline_degree in NODIF		INTEGER	—
B-spline_knot_vector	Properties	zone form	B-spline knot vector	B-spline knot vector of B-spline closed curve	4.3.19.10.11 B-spline_knot_vector in NODIF	—	three-dimensional real vector	—
centre_coordinates	Properties	zone form	centre coordinates	centre coordinates of circle or ellipse	4.3.19.10.2 centre_coordinates in NODIF	—	three-dimensional real vector	—
control_point_coordinates	Properties	zone form	control point coordinates	coordinates of control points of B-spline closed curve	4.3.19.10.9 control_point_coordinates in NODIF	—	three-dimensional real vector	—
major_axis	Properties	zone form	major axis	major axis length of ellipse	4.3.19.10.4 major_axis in NODIF	mm	REAL	—
major_axis_argument	Properties	zone form	major axis argument	argument of major axis of ellipse	4.3.19.10.6 major_axis_argument in NODIF	degree	REAL	—
minor_axis	Properties	zone form	minor axis	minor axis length of ellipse	4.3.19.10.5 minor_axis in NODIF	mm	REAL	—
number_of_points	Properties	zone form	number of points	the number of vertices of polygon or control points of B-spline closed curve	4.3.19.10.7 number_of_points in NODIF		INTEGER	—

Table 2 (*concluded*)

NODIF Keyword	Hierarchy	Class	Preferred name	Definition	Note	Unit	Property data type	Reference dictionary ID number
vertex_coordinates	Properties	zone form	vertex coordinates	coordinates of vertices of polygon	4.3.19.10.8 vertex_coordinates in NODIF	—	three-dimensional real vector	—
radius	Properties	zone form	zone radius	radius of circular zone	4.3.19.10.3 radius in NODIF	mm	REAL	—

Annex A
(informative)

Class hierarchy

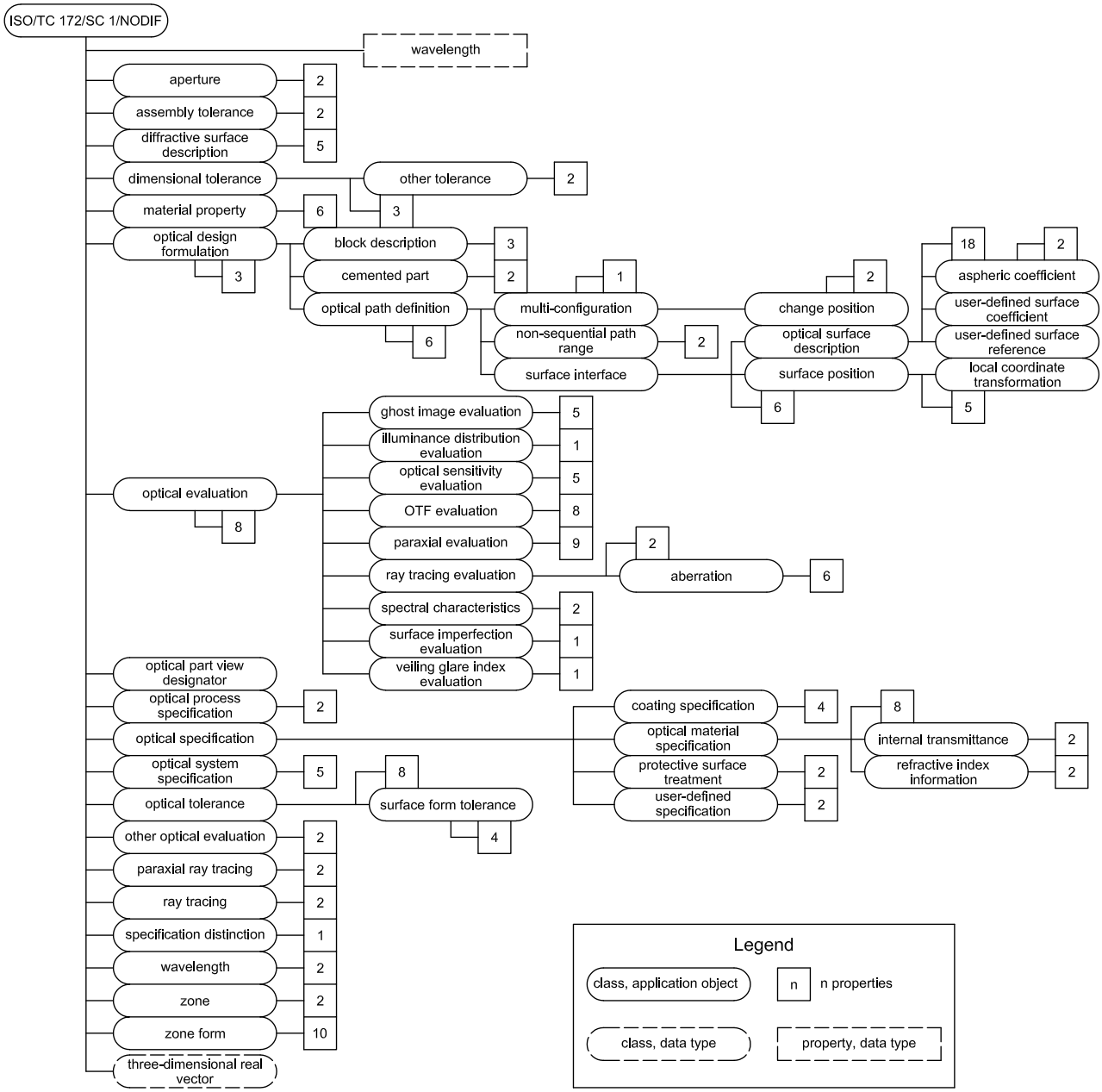

Figure A.1 — Class hierarchy

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1) Withdrawn and replaced by ISO 10110-5:2007.

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