12 Profiles

12.1 Introduction

A *profile* identifies a subset of this International Standard that has been specified to meet the needs of a specific application area. Only those subsets that can define, represent and/or process positions in at least one SRF shall be allowed. The core of a profile is a specified set of SRFTs, along with an applicable set of ORMs, and sets of SRFs and/or SRF sets that can be specified using these SRFTs and ORMs. A profile definition also may include computational accuracy requirements for conformance (see Clause 14) of any functional implementations of operations that apply to the SRFs included in the profile. The default profile requires support for all SRFTs and ORMs specified in this International Standard. Additional profiles may be specified by registration in accordance with Clause 13.

An SRM profile specification includes:

a) a description of the profile (see 13.2.4),

b) a specification of a non-empty subset of standardized and registered ORMs, such that each ORM in the set shall be applicable to at least one SRFT specified in c,

c) a specification of a non-empty subset of the set of standardized and registered SRFTs such that for each SRFT in the set, there is at least one ORM specified in b that is applicable to that SRFT,

d) specifications of subsets of standardized and registered SRFs and SRF sets based on SRFTs specified in c, and applicable ORMs in b; these subsets shall not both be empty,

e) a (possibly empty) subset of the set of standardized and registered DSSs, and

f) optional specifications of computational accuracy requirements, consisting of an accuracy domain and positional, directional, and ratio error bounds, for SRFTs specified in c.

Accuracy domains and computational accuracy requirements are defined in 14.2.1. The “default” profile is specified in 12.3. Guidelines for registering profiles are in 13.3.13. The proposal format for profile registration is provided in H.14. Conformance requirements are specified in 14.2.

12.2 Profile specification

The elements of a profile specification are defined in Table 12.1.

Table 12.1 — SRM profile specification elements

Element	Definition
Profile label	The label of the profile (see 13.2.2).
Profile code	The code of the profile (see 13.2.3).
Description	A description of the profile (see 13.2.4).
Standard edition used	The edition number of the SRM standard from which the entries in the profile are obtained.
Amendment(s) used	A list of all associated amendment numbers from which the entries in the profile are obtained, or "0" if no amendments are used.

Element	Definition	
Registered concept(s) included	"Yes" or "No", indicating whether any registered entries from the International Register of Items are included in the profile.	
ORM(s)	A non-empty subset of standardized and registered ORMs, such that each ORM in the subset shall be applicable to at least one SRFT in the profile.	
SRFT(s)	A non-empty subset of standardized and registered SRFTs, such that for each SRFT in the subset, there is at least one ORM in the profile that is applicable to that SRFT.	
SRF(s)	A subset of the standardized and registered SRFs that are derived from an SRFT in the profile SRFT(s) element and specifying an ORM in the profile ORM(s) element.	
SRF set(s)	A subset of the standardized and registered SRF sets that are derived from an SRFT in the profile SRFT(s) element, and such that at least one ORM specified in the profile ORM(s) element satisfies the ORM constraint of the SRF set.	
DSS(s)	A subset of the standardized and registered DSSs.	
Computational accuracy requirements	This optional element may be repeated for single SRFTs or groups of SRFTs in the profile. An SRFT in the profile shall appear in at most one of these elements.	
	SRFT label(s)	The label(s) of one or more SRFTs in the profile.
	Error bounds	ε_P: the positional error bound in metres, ε_D: the directional error bound in radians, and ε_R: the ratio error bound. Optionally, separate error bounds for one or more subsets of the ORMs associated with the listed SRFTs in the SRFT label(s) element.
	Accuracy domain	A set of constraints that specify: a subset of the CS domain; and/or SRFT parameter value ranges (see 14.2.1).

The non-empty subsets of ORMs, SRFTs, SRFs, SRF sets and DSSs may be explicit or may be expressed in a clear and unambiguous short-hand form that, when expanded, ensures the intended subset is produced.

EXAMPLE 1 "All standardized ORMs".

EXAMPLE 2 "All standardized SRFs".

EXAMPLE 3 "All object-fixed ERMs".

EXAMPLE 4 "All standardized ORMs in the profile SRM_3_0_MARS_PROJECT_PROFILE", where SRM_3_0_MARS_PROJECT_PROFILE is the label of an existing profile.

As specified in 4.1, the unit of length is the metre, and the unit of angular measure is the radian.

An implementation conforms to the computational accuracy requirement of a profile if for every SRF that is included in the profile or is a member of an SRF set that is included in the profile, positional, directional and ratio errors for operations on SRF coordinates in the accuracy domain shall not exceed the positional, directional and ratio error bounds (if any) specified in the computational accuracy requirements element applicable to both the ORM and SRFT of the SRF. These requirements assume computational digital accuracy at least as accurate as double precision, as specified in ISO/IEC/IEEE 60559.

Positional error may be estimated from coordinate values using the methods in I.6. Directional errors apply to spatial operations that compute an angle. Ratio errors apply to spatial operations that compute point distortion.

For implementations of geodesic distance (see 10.7), the computational accuracy requirement shall apply to distances not exceeding 95% of the longest geodesic distance on the applicable oblate ellipsoid RD.

12.3 Default profile

The default profile is specified in Table 12.2. This profile supports all the functionality specified in this International Standard but does not include any registered items. This profile includes all ORMs, SRF templates, SRF sets, SRF set members, and standardized SRFs as defined in this International Standard. computational accuracy requirements are provided for conformance of implementations of the corresponding operations and functionality.

Table 12.2 — Default profile specification

Element	Specification	
Profile label	SRM_3_0_DEFAULT_PROFILE	
Profile code	1	
Description	Full functionality for standardized SRM concept instances.	
Standard edition used	3	
Amendment(s) used	0	
Registered concept(s) included	No.	
ORMs	All standardized ORMs. (See Annex E.)	
SRFTs	All standardized SRFTs. (See 8.5.)	
SRFs	All standardized SRFs. (See 8.6.)	
SRF sets	All standardized SRF sets. (See 8.7.)	
DSSs	All standardized DSSs. (See 9.8.)	
Computational accuracy requirements	**SRFT label(s)**	CELESTIOCENTRIC LOCAL_SPACE_RECTANGULAR_3D LOCAL_TANGENT_SPACE_EUCLIDEAN LOCOCENTRIC_EUCLIDEAN_3D SOLAR_MAGNETIC_ECLIPTIC SOLAR_MAGNETIC_DIPOLE LOCAL_SPACE_RECTANGULAR_2D
	Error bounds	ε_P = 0,001m, ε_D = 0,000 1rad, ε_R = 0,000 1.
	Accuracy domain	$d_E(\boldsymbol{c}, (0,0,0)) \leq 1\,000\,000\,000$m for all $\boldsymbol{c}$ in the CS domain

Element	Specification	
Computational accuracy requirements	**SRFT label(s)**	LOCAL_TANGENT_SPACE_AZIMUTHAL_SPHERICAL LOCAL_TANGENT_SPACE_CYLINDRICAL CELESTIOMAGNETIC EQUATORIAL_INERTIAL SOLAR_ECLIPTIC SOLAR_EQUATORIAL HELIOSPHERIC_ARIES_ECLIPTIC HELIOSPHERIC_EARTH_ECLIPTIC HELIOSPHERIC_EARTH_EQUATORIAL LOCAL_SPACE_AZIMUTHAL LOCAL_SPACE_POLAR
	Error bounds	ε_P = 0,001m, ε_D = 0,000 1rad, ε_R = 0,000 1.
	Accuracy domain	0,01m ≤ ρ ≤ 1 000 000 000m.
Computational accuracy requirements	**SRFT label(s)**	CELESTIODETIC PLANETODETIC
	Error bounds	ε_P = 0,001m, ε_D = 0,000 1rad, ε_R = 0,000 1. For OBLATE_ELLIPSOID, OBLATE_ELLIPSOID_ORIGIN: a ≤ 6 400 000m and f ≤ 1/150 For SPHERE, SPHERE_ORIGIN: r ≤ 6 400 000m.
	Accuracy domain	–50 000m ≤ h ≤ +1 000 000m.
Computational accuracy requirements	**SRFT label(s)**	TRANSVERSE_MERCATOR
	Error bounds	ε_P = 0,001m, ε_D = 0,000 1rad, ε_R = 0,000 1. For OBLATE_ELLIPSOID, OBLATE_ELLIPSOID_ORIGIN: a ≤ 6 400 000m and f ≤ 1/150 For SPHERE, SPHERE_ORIGIN: r ≤ 6 400 000m.
	Accuracy domain	For $k_0 \geq 0{,}1$: $-3{,}5\left(\frac{\pi}{180}\right) \leq \lambda - \lambda_{\text{origin}} \leq 3{,}5\left(\frac{\pi}{180}\right)$, $-89{,}5\left(\frac{\pi}{180}\right) \leq \varphi \leq 89{,}5\left(\frac{\pi}{180}\right)$, and $-50\,000\text{m} \leq h \leq +1\,000\,000\text{m}$.
	SRFT label(s)	MERCATOR EQUIDISTANT_CYLINDRICAL

Element	Specification	
Computational accuracy requirements	**Error bounds**	ε_P = 0,001m, ε_D = 0,000 1rad, ε_R = 0,000 1. For OBLATE_ELLIPSOID, OBLATE_ELLIPSOID_ORIGIN: $a \leq$ 6 400 000m and $f \leq$ 1/150 For SPHERE, SPHERE_ORIGIN: $r \leq$ 6 400 000m.
	Accuracy domain	$k_0 \geq 0{,}1$: $-89{,}5\left(\frac{\pi}{180}\right) \leq \varphi \leq 89{,}5\left(\frac{\pi}{180}\right)$, and $-50\ 000\text{m} \leq h \leq +1\ 000\ 000\text{m}$.
Computational accuracy requirements	**SRFT label(s)**	OBLIQUE_MERCATOR_SPHERICAL
	Error bounds	ε_P = 0,001m, ε_D = 0,000 1rad, ε_R = 0,000 1. For OBLATE_ELLIPSOID, OBLATE_ELLIPSOID_ORIGIN: $a \leq$ 6 400 000m and $f \leq$ 1/150 For SPHERE, SPHERE_ORIGIN: $r \leq$ 6 400 000m.
	Accuracy domain	$k_0 \geq 0{,}1$: (λ, φ) such that $k(\lambda, \varphi) \leq 5$, where $k(\lambda, \varphi)$ is the point distortion function, and $-50\ 000\text{m} \leq h \leq +1\ 000\ 000\text{m}$. (See Table 5.19.)
Computational accuracy requirements	**SRFT label(s)**	LAMBERT_CONFORMAL_CONIC
	Error bounds	ε_P = 0,001m, ε_D = 0,000 1rad, ε_R = 0,000 1. For OBLATE_ELLIPSOID, OBLATE_ELLIPSOID_ORIGIN: $a \leq$ 6 400 000m and $f \leq$ 1/150 For SPHERE, SPHERE_ORIGIN: $r \leq$ 6 400 000m.
	Accuracy domain	(λ, φ) such that $k(\lambda, \varphi) \leq 5$, where $k(\lambda, \varphi)$ is the point distortion function, and $-50\ 000\text{m} \leq h \leq +1\ 000\ 000\text{m}$. (See Table 5.21.)
	SRFT label(s)	POLAR_STEREOGRAPHIC

Element	Specification	
Computational accuracy requirements	**Error bounds**	ε_P = 0,001m, ε_D = 0,000 1rad, ε_R = 0,000 1. For OBLATE_ELLIPSOID, OBLATE_ELLIPSOID_ORIGIN: a ≤ 6 400 000m and $f \leq 1/150$ For SPHERE, SPHERE_ORIGIN: r ≤ 6 400 000m.
	Accuracy domain	$0 \leq \varphi \leq +\pi/2$ (north aspect), or $-\pi/2 \leq \varphi \leq 0$ (south aspect), and $-50\ 000\text{m} \leq h \leq +1\ 000\ 000\text{m}$. (See Table 5.22.)