Template for Describing Centrifuge Types: Explanatory Note

I General

1. This attachment defines the template to be used for describing the different centrifuge types addressed in the Joint Comprehensive Plan of Action (JCPOA), as per Paragraph 54 of Annex I.

2. Iran will provide the numerical values and other information required to complete this template to the International Atomic Energy Agency (IAEA) and the Joint Commission by Implementation Day.

II Template, definitions, and tolerances

1. The attached table defines the numerical values and information required for the template, subject to the following definitions and tolerances.

2. As a fully developed and mature centrifuge design, and recognising that centrifuges are manufactured to precise specifications, the numerical information in the template for the IR-1 centrifuge is not subject to any further tolerance.

3. The following information provides further definition for selected design parameters listed in the template.
    a) Rotor assembly length is the length of the assembled rotor from the top of the top rotor tube to the bottom of the bottom rotor tube.
    b) Overall casing height is the height of the centrifuge machine from the top of the mounting block to the top of the casing upper flange, but exclusive of antennae or upper flange ports for instrument connection.
    c) Casing outer diameter is the diameter of the centrifuge casing that is present over the majority of the centrifuge length.
    d) Rotor tube length is the length of each rotor tube in the rotor assembly.
    e) For rotor tube material of construction, Iran will provide the technical specifications (for composite material, ultimate tensile strength and specific modulus) or commercial manufacturer’s product designator of the materials used for production of rotor tubes for each type of centrifuge.

i. Iran will establish new locations at rotor tube manufacturing facilities solely for monitored storage of materials to be used for the manufacture of centrifuge rotors, for as long as paragraph 61 of Annex I of the JCPOA remains in effect, which will contain solely materials supplied in accordance with the procurement channel for as long as that procurement channel remains in effect.
ii. The IAEA would maintain containment and surveillance at these storage locations.
iii. For the materials to be used for centrifuge rotor manufacturing, the IAEA would verify the technical specifications of the materials prior to entering the monitored storage locations. When such materials are supplied in accordance with the procurement channel, such verification will be conducted outside Iran and the IAEA would maintain continuity of knowledge of these materials (e.g., through seals) until they enter the monitored storage locations. After the procurement channel is no longer in effect, for as long as paragraph 61 of Annex I of the JCPOA remains in effect, if such materials are received from an external supplier such verification will be conducted outside Iran and the IAEA would maintain continuity of knowledge of these materials (e.g., through seals) until they enter the monitored storage locations.[1] Iran will arrange for such IAEA verification.
iv. No materials would enter the monitored storage locations unless the IAEA has conducted verification of the technical specifications of the materials and maintained continuity of knowledge.
v. The IAEA would verify that Iran only engages in manufacturing of centrifuge rotor tubes using the materials that are drawn from the above referenced dedicated monitored storage locations for as long as Paragraph 61 of Annex I of the JCPOA remains in effect, subject to the exception specified below.

[1] This is without prejudice to the exemptions specified in paragraph 2 of Annex B of the UNSCR 2231 of 20 July 2015.

vi. Despite the readiness of supply, Iran may decide, consistent with the JCPOA, to manufacture centrifuge rotor tubes using its own materials of construction, provided that the IAEA has verified the technical specifications of these materials through sampling and maintained them under monitoring until their use in the manufacture of rotor tubes.

vii. The IAEA will report to the Joint Commission in case of any inconsistency of the materials used for the production of each type of centrifuge.

f) Estimated kg (U) SWU/y per centrifuge is an estimated range for the separative capacity of the centrifuge type when fully developed, in kilogram (uranium) separative work units per year per centrifuge.

g) For bellows material of construction, Iran will provide the material (metal or composite).

4. Numerical values in the template for all centrifuge types other than the IR-1 are subject to the following tolerances.
   a) For rotor assembly length, plus/minus 5 per cent of the specified value.
   b) For rotor tube inner diameter, plus/minus 2 per cent of the specified value.
   c) For overall casing height, plus/minus 10 per cent of the specified value.
   d) For casing outer diameter, plus/minus 5 per cent of the specified value.

III Changes to Template Information

For any deviation from the information for a centrifuge type in the completed template, a full presentation by Iran to, and approval by, the Joint Commission is needed.

Template Describing Centrifuge Types

	Design parameter	IR-1	IR-2m	IR-4	IR-5	IR-6	IR-6s	IR-7	IR-8
1	Rotor assembly length (mm)	X	X	X	X	X	X	X	X
2	Rotor tube inner diameter (mm)	X	X	X	X	X	X	X	X
3	Overall casing height (mm)	X	X	X	X	X	X	X	X
4	Casing outer diameter (mm)	X	X	X	X	X	X	X	X
5	Rotor tube material of construction	X	X	X	X	X	X	X	X
6	Number of bellows	X	X	X	X	X	X	X	X
7	Estimated kg (U) SWU/y per centrifuge	X	X	X	X	X	X	X	X
8	Rotor tube length (mm)	X	O	O	O	O	O	O	O
9	Bellows material of construction	X	X	X	X	X	X	X	X

Explanation: X to be part of the template; O not to be part of the template.