

- (b)(i) The qualified manufacturer should have manufactured, tested and supplied at least two hundred (200) km of AL59 conductor of thirty seven (37) strands or above during last seven (7) years as on date of NOA.

OR

- (b)(ii) A manufacturer not meeting the requirements stipulated in clause (b)(i) above can also participate provided he has manufactured, tested and supplied at least cumulative two hundred (200) km of AAAC/ AL59/AACSR conductor of thirty seven (37) strands or above during last seven (7) years and should have manufactured & successfully completed following tests on AL59 Conductor of thirty seven (37) strands or above, as on date of NOA: -

- i) UTS test
- ii) DC resistance test

- 2.24.2** The proposed manufacturer can also be a qualified Licensee of a qualified manufacturer meeting the above specified requirements at 2.24.1 (a) & 2.24.1(b) (i) above and also meeting the conditions stipulated at 2.43.

2.25 AL59 PANTHER Conductor

- 2.25.1** The qualified manufacturer's experience should include the following:

- (a) The qualified manufacturer should have manufactured, tested and supplied at least cumulative one thousand (1000) km of ACSR/ AAAC/ AL59/ AACSR conductor with thirty seven (37) strands or above during last seven (7) years as on date of NOA and
- (b)(i) The qualified manufacturer should have manufactured, tested and supplied at least two hundred (200) km of AL59 conductor of thirty seven (37) strands or above during last seven (7) years as on date of NOA.

OR

- (b)(ii) A manufacturer not meeting the requirements stipulated in clause (b)(i) above can also participate provided he has manufactured, tested and supplied at least cumulative two hundred (200) km of AAAC/ AL59/ AACSR conductor of thirty seven (37) strands or above during last seven (7) years and should have manufactured & successfully completed following tests on AL59 Conductor of thirty seven (37) strands or above, as on date of NOA: -
- i) UTS test
 - ii) DC resistance test

2.25.2 The proposed manufacturer can also be a qualified Licensee of a qualified manufacturer meeting the above specified requirements at 2.25.1 (a) & 2.25.1(b) (i) above and also meeting the conditions stipulated at 2.43.

2.26 HTLS Conductor for 400 kV voltage level transmission lines

2.26.1 (a) The Qualified Manufacturer should have manufactured, tested and supplied at least one hundred (100) km of High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in this package having minimum thirty seven (37) number of strands or 200 sq. mm. aluminum cross section area in last seven (7) years as on date of NOA and the same should have been in satisfactory operation⁵ for a period of at least one (1) year as on date of NOA.

OR

(b) The Qualified Manufacturer should have manufactured, tested and supplied at least one hundred (100) km of High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in this package having minimum thirty seven (37) number of strands or 200 sq. mm. aluminum cross section area in last seven (7) years as on date of NOA and the same should have been in satisfactory operation⁵ as on date of NOA.

Note: In case of Clause 2.26.1 b) above, the warranty obligations in terms of 10% of the ex-work cost of the HTLS conductor for additional period of two (2) years over and above the warranty period as specified in the bidding documents shall be applicable.

OR

(c) The manufacturer not meeting the qualification requirements stipulated in clause 2.26.1(a) or 2.26.1(b) above can also participate as a Licensee of a Licensor meeting the requirement stipulated at Clause 2.26.1(a) and also meeting the conditions stipulated at Clause 2.44 provided that: -

- i) The manufacturer/ Licensee has manufactured, tested and supplied at least cumulative one thousand (1000) km of ACSR/ AAAC/ ACAR/ AACSR/ AL59 conductor having at least same or more number of strands as that of the conductor being offered in the package during last seven (7) years as on the date of NOA and
- ii) The manufacturer/ Licensee should have established manufacturing facility & developed High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in the package having

minimum thirty seven (37) number of strands or 200 sq. mm aluminium cross section area and should have successfully carried out following tests as on date of NOA: -

A) **On complete Conductor**

- i) DC resistance test on stranded conductor
- ii) UTS test on stranded conductor at ambient & at designed elevated temperature (minimum 150 deg C design temperature)

B) **On Conductor strand/ core**

- i) Heat resistance test on Aluminium Alloy strands (not applicable for annealed aluminium)
- ii) Torsion & Elongation tests on core strands#/ composite core#
- iii) Breaking load test on core strands#/ composite core# and Aluminium#/ Aluminium Alloy# strands
- iv) Conductivity test on thermal resistant Aluminium#/ Aluminium Alloy# strands
- v) Glass transition temperature test (for composite core only)
- vi) Flexural strength test (for composite core only)

as the case may be

Note:

1. The tests indicated at B) above should have been carried out by the manufacturer/ Licensee on their own or by their supplier of aluminium alloy strands, core/ core strands.
2. In case of Clause 2.26.1 c) above, the manufacturer participating as a Licensee shall provide warranty obligations in terms of 10% of the ex-work cost of the HTLS conductor for additional period of two (2) years over and above the warranty period specified in the bidding documents.

2.27 HTLS Conductor for 220 kV voltage level transmission lines

- 2.27.1** (a) The Qualified Manufacturer should have manufactured, tested and supplied at least one hundred (100) km of High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in this package having minimum thirty three (33) number of strands or 150 sq. mm. aluminum cross section area in last seven (7) years as on date of NOA and the same should have

been in satisfactory operation\$ for a period of at least one (1) year as on date of NOA.

OR

(b) The Qualified Manufacturer should have manufactured, tested and supplied at least one hundred (100) km of High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in this package having minimum thirty three (33) number of strands or 150 sq. mm. aluminum cross section area in last seven (7) years as on date of NOA and the same should have been in satisfactory operation^s as on date of NOA.

Note: In case of Clause 2.27.1 b) above, the warranty obligations in terms of 10% of the ex-work cost of the HTLS conductor for additional period of two (2) years over and above the warranty period as specified in the bidding documents shall be applicable.

OR

(c) The manufacturer not meeting the qualification requirements stipulated in clause 2.27.1(a) or 2.27.1(b) above can also participate as a Licensee of a Licensor meeting the requirement stipulated at Clause 2.27.1 (a) and also meeting the conditions stipulated at Clause 2.44 provided that: -

- i) The manufacturer/ Licensee has manufactured, tested and supplied at least cumulative one thousand (1000) km of ACSR/ AAAC/ ACAR/ AACSR/ AL59 conductor having at least same or more number of strands as that of the conductor being offered in the package during last seven (7) years as on the date of NOA and
- ii) The manufacturer/ Licensee should have established manufacturing facility & developed High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in the package having minimum thirty three (33) number of strands or 150 sq. mm aluminium cross section area and should have successfully carried out following tests as on date of NOA: -

A) **On complete Conductor**

- i) DC resistance test on stranded conductor
- ii) UTS test on stranded conductor at ambient & at designed elevated temperature (minimum 150 deg C design temperature)

B) On Conductor strand/ core

- i) Heat resistance test on Aluminium Alloy strands (not applicable for annealed aluminium)
- ii) Torsion & Elongation tests on core strands#/ composite core#
- iii) Breaking load test on core strands#/ composite core# and Aluminium#/ Aluminium Alloy# strands
- iv) Conductivity test on thermal resistant Aluminium#/ Aluminium Alloy# strands
- v) Glass transition temperature test (for composite core only)
- vi) Flexural strength test (for composite core only)

as the case may be

Note:

1. The tests indicated at B) above should have been carried out by the manufacturer/ Licensee on their own or by their supplier of aluminium alloy strands, core/ core strands.
2. In case of Clause 2.27.1 c) above, the manufacturer participating as a Licensee shall provide warranty obligations in terms of 10% of the ex-work cost of the HTLS conductor for additional period of two (2) years over and above the warranty period specified in the bidding documents.

2.28 HTLS Conductor for 132 kV voltage level transmission lines

- 2.28.1** (a) The Qualified Manufacturer should have manufactured, tested and supplied at least one hundred (100) km of High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in this package having minimum thirty (30) number of strands or 100 sq. mm. aluminum cross section area in last seven (7) years as on date of NOA and the same should have been in satisfactory operation⁵ for a period of at least one (1) year as on date of NOA.

OR

(b) The Qualified Manufacturer should have manufactured, tested and supplied at least one hundred (100) km of High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in this package having minimum thirty (30) number of strands or 100 sq. mm. aluminum cross section area in last seven (7) years as on date of NOA and the same should have been in satisfactory operation⁵ as on date of NOA.

Note: In case of Clause 2.28.1 b) above, the warranty obligations in terms of 10% of the ex-work cost of the HTLS conductor for additional period of two (2) years over and above the warranty period as specified in the bidding documents shall be applicable.

OR

(c) The manufacturer not meeting the qualification requirements stipulated in clause 2.28.1(a) or 2.28.1(b) above can also participate as a Licensee of a Licensor meeting the requirement stipulated at Clause 2.28.1(a) and also meeting the conditions stipulated at Clause 2.44 provided that: -

i) The manufacturer/ Licensee has manufactured, tested and supplied at least cumulative one thousand (1000) km of ACSR/ AAAC/ ACAR/ AACSR/ AI59 conductor having at least same or more number of strands as that of the conductor being offered in the package during last seven (7) years as on the date of NOA and

ii) The manufacturer/ Licensee should have established manufacturing facility & developed High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in the package having minimum thirty (30) number of strands or 100 sq. mm aluminium cross section area and should have successfully carried out following tests as on date of NOA:-

A) **On complete Conductor**

- i) DC resistance test on stranded conductor
- ii) UTS test on stranded conductor at ambient & at designed elevated temperature (minimum 150 deg C design temperature)

B) **On Conductor strand/ core**

- i) Heat resistance test on Aluminium Alloy strands (not applicable for annealed aluminium)
- ii) Torsion & Elongation tests on core strands#/ composite core#
- iii) Breaking load test on core strands#/ composite core# and Aluminium#/ Aluminium Alloy# strands
- iv) Conductivity test on thermal resistant Aluminium#/ Aluminium Alloy# strands
- v) Glass transition temperature test (for composite core only)
- vi) Flexural strength test (for composite core only)

as the case may be

Note:

1. The tests indicated at B) above should have been carried out by the manufacturer/ Licensee on their own or by their supplier of aluminium alloy strands, core/ core strands.
2. In case of Clause 2.28.1 c) above, the manufacturer participating as a Licensee shall provide warranty obligations in terms of 10% of the ex-work cost of the HTLS conductor for additional period of two (2) years over and above the warranty period specified in the bidding documents.

2.29 Technical Qualification Requirement for supplier of core of any special material for High temperature low sag conductor (HTLS)

The Conductor manufacturer shall use core of any special material (if used) such as Invar steel or composite core supplied from the qualified manufacture(s) meeting the following requirements: -

The Qualified Manufacturer should have manufactured, tested and supplied at least two hundred (200) km of the same type of core material as used in the HTLS conductor being offered in the package. Further, conductor manufactured from the supplied core of such manufacturers should have been in satisfactory operation^s for a period of at least two years as on date of NOA.

An undertaking by the proposed supplier of core of HTLS conductor shall be submitted during execution of the contract (Performa enclosed as **Annexure-D** to this section).

2.30 Clamp fittings and accessories for high temperature low sag conductor (HTLS) for 400 kV voltage level transmission lines

- 2.30.1** (a) The qualified manufacturer(s) should have designed, manufactured, tested and supplied fittings for suspension & tension strings and accessories for any type of conductor, viz. ACSR, AACSR, AAAC etc. for 345/400 kV or above voltage transmission line.

Further, the qualified manufacturer(s) for any individual item(s) of clamp fittings and accessories covered under the package should have designed, manufactured, tested and supplied the item(s) of clamp fittings and accessories for High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in the package(s) for application on 66 kV or above voltage transmission line and the same should have been in satisfactory operation⁵ for a minimum period of two (2) years as on date of NOA.

The manufacturer(s) meeting the above requirement for any individual item or items shall be considered qualified for the respective item or items only.

b) However, if the proposed manufacturer of Hardware fittings and Accessories for conductor is not meeting the above requirements on its own, he should be qualified licensee of a qualified manufacturer meeting the above specified requirements and meeting the conditions stipulated at 2.43.

2.30.2 For Indigenous Manufacturer

The Indigenous manufacturer[^] of hardware fittings and accessories not meeting the requirement of clause 2.30.1(a) above can also supply provided they meet the following requirements: -

The indigenous manufacturer[^] must have designed, manufactured, tested and supplied fittings for suspension & tension strings and accessories for any type of conductor, viz. ACSR, AACSR, AAAC etc. for 345/400 kV or above voltage transmission line as on date of NOA.

Further, the indigenous manufacturer[^] for any individual item(s) of clamp fittings and accessories covered under the package should have designed, manufactured and type tested, as per the Technical specification of POWERGRID, the item(s) of clamp fittings and accessories for same technology of HTLS conductor as being offered in the package for application of 345/400 kV or above voltage transmission line as on date of NOA.

The Contractor shall furnish a legally enforceable undertaking for extended warranty^{^^} of additional two (2) years over and above the warrantee period specified under the package.

^ Indigenous manufacturer means a manufacturer who proposes to offer the fittings and accessories for HTLS conductor from manufacturing facilities located in India.

^^ Additional extended warranty in terms of 10 % CPG corresponding to cost of the item(s).

2.31 Clamp fittings and accessories for high temperature low sag conductor (HTLS) for 220kV voltage level transmission line

- 2.31.1** a) The qualified manufacturer(s) should have designed, manufactured, tested and supplied fittings for suspension & tension strings and accessories for any type of conductor, viz. ACSR, AACSR, AAAC etc. for 220 kV or above voltage transmission line. Further, the qualified manufacturer(s) for any individual item(s) of clamp fittings and accessories covered under the package should have designed, manufactured, tested and supplied the item(s) of clamp fittings and accessories for High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in the package(s) for application on 66 kV or above voltage transmission line and the same should have been in satisfactory operation⁵ for a minimum period of two (2) years as on date of NOA.

The manufacturer(s) meeting the above requirement for any individual item or items shall be considered qualified for the respective item or items only.

b) However, if the proposed manufacturer of Hardware fittings and Accessories for conductor is not meeting the above requirements on its own, he should be qualified licensee of a qualified manufacturer meeting the above specified requirements and meeting the conditions stipulated at 2.43.

2.31.2 For Indigenous Manufacturer

- a) The Indigenous manufacturer[^] of hardware fittings and accessories not meeting the requirement of clause 2.31.1(a) above can also supply provided they meet the following requirements: -

The indigenous manufacturer[^] must have designed, manufactured, tested and supplied fittings for suspension & tension strings and accessories for any type of conductor, viz. ACSR, AACSR, AAAC etc. for 220 kV or above voltage transmission line as on date of NOA.

Further, the indigenous manufacturer[^] for any individual item(s) of clamp fittings and accessories covered under the package should have designed, manufactured and type tested, as per the Technical specification of POWERGRID, the item(s) of clamp fittings and accessories for same technology of HTLS conductor as being offered in the package for application of 220 kV or above voltage transmission line as on date of NOA.

The Contractor shall furnish a legally enforceable undertaking for extended warranty^{^^} of additional two (2) years over and above the warrantee period specified under the package.

[^] Indigenous manufacturer means a manufacturer who proposes to offer the fittings and accessories for HTLS conductor from manufacturing facilities located in India.

^{^^} Additional extended warranty in terms of 10% CPG corresponding to cost of the item(s).

2.32 Clamp fittings and accessories for high temperature low sag conductor (HTLS) for 132kV voltage level transmission lines

2.32.1 The qualified manufacturer(s) should have designed, manufactured, tested and supplied fittings for suspension & tension strings and accessories for any type of conductor, viz. ACSR, AACSR, AAAC etc. for 110/ 132 kV or above voltage transmission line.

Further, the qualified manufacturer(s) for any individual item(s) of clamp fittings and accessories covered under the package should have designed, manufactured, tested and supplied the item(s) of clamp fittings and accessories for High temperature low sag (HTLS) conductor of same technology as that of the conductor being offered in the package(s) for application on 66 kV or above voltage transmission line and the same should have been in satisfactory operation[§] for a minimum period of two (2) years as on date of NOA.

The manufacturer(s) meeting the above requirement for any individual item or items shall be considered qualified for the respective item or items only.

b) However, if the proposed manufacturer of Hardware fittings and Accessories for conductor is not meeting the above requirements on its own, he should be qualified licensee of a qualified manufacturer meeting the above specified requirements and meeting the conditions stipulated at 2.43.

2.32.2 For Indigenous Manufacturer

The Indigenous manufacturer[^] of hardware fittings and accessories not meeting the requirement of clause 2.32.1(a) above can also supply provided they meet the following requirements: -

The indigenous manufacturer[^] must have designed, manufactured, tested and supplied fittings for suspension & tension strings and accessories for any type of conductor, viz. ACSR, AACSR, AAAC etc. for 110/132 kV or above voltage transmission line as on date of NOA.

Further, the indigenous manufacturer[^] for any individual item(s) of clamp fittings and accessories covered under the package should have designed, manufactured and type tested, as per the Technical specification of POWERGRID, the item(s) of clamp fittings and accessories for same technology of HTLS conductor as being offer in the package for application of 110/ 132 kV or above voltage transmission line as on date of NOA.

The Contractor shall furnish a legally enforceable undertaking for extended warranty^{^^} of additional two (2) years over and above the warrantee period specified under the package.

[^] Indigenous manufacturer means a manufacturer who proposes to offer the fittings and accessories for HTLS conductor from manufacturing facilities located in India.

^{^^} Additional extended warranty in terms of 10% CPG corresponding to cost of the item(s).

2.33 Hardware Fittings for 765kV voltage level transmission lines

2.33.1 The qualified manufacturer shall be a manufacturer of hardware fittings of similar nature. The qualified manufacturer's experience should include the following:

- (i) The qualified manufacturer should have designed, manufactured, tested and supplied hardware fittings for at least 600 sets of tension strings and 1200 sets of suspension strings for 765kV or above voltage transmission line and the same should have been in satisfactory operation[§] for a minimum period of two (2) years as on date of NOA;

OR

(ii) (a) Alternatively, the qualified manufacturer should have designed, manufactured, tested and supplied hardware fittings for at least 600 sets of tension strings and 1200 sets of suspension strings for 345kV or above voltage transmission line and the same should have been in satisfactory operation for a minimum period of two (2) years as on as on date of NOA; and

(b) The qualified manufacturer should also have successfully completed at least the following type tests on tension & suspension strings for 765kV or above application as on date of NOA: -

- Power Frequency Voltage withstand test (Wet)
- Switching Surge Voltage Withstand test (Wet)
- Lightning Impulse Voltage Withstand test (Dry)
- Corona & Radio Interference Voltage Test (Dry)

(iii) In case of indigenous manufacturers, if the Qualified manufacturer is not meeting the stipulated two years operational experience requirements specified at (i) & (ii) (a) above, the contractor shall furnish extended warranty^{^^} of additional two years over and above the warranty period specified under the package.

^{^^} Additional extended warranty in terms of 10% CPG corresponding to cost of the item(s).

2.33.2 The proposed manufacturer can also be a qualified licensee of a qualified manufacturer meeting the above specified requirements at 2.33.1 (i) or (ii) and also meeting the conditions stipulated at 2.43.

2.34 Hardware Fittings for 400 kV voltage level transmission line

2.34.1 The qualified manufacturer shall be a manufacturer of hardware fittings of similar nature. The qualified manufacturer's experience should include the following:

(i) The qualified manufacturer should have designed, manufactured, tested and supplied hardware fittings for at least 600 sets of tension strings and 1200 sets of suspension strings for 345kV or above voltage transmission line and the same should have been in satisfactory operation[§] for a minimum period of two (2) years as on date of NOA: -

OR

(ii) (a) Alternatively, the qualified manufacturer should have designed, manufactured, tested and supplied hardware fittings for at least 600 sets of tension strings and 1200 sets of suspension strings for 220kV or above voltage