

Indent: 20240659

(This PQR is applicable for Valve Spindle, Valve Cone & Valve Cone With Spindle)

Technical Pre-Qualification Requirement (PQR) for Process of hardfacing (HS75-25 + Stellite 6/Stellite 21/Alloy 625)

Sl.	PQR Condition	Documents to be submitted	Vendor's remarks
1	Experience Criteria:		
1.1	Vendor must have experience of carrying out thermal spray coating of Cr ₃ C ₂ +NiCr by HVOF process or detonation gun process on components made of alloy steel.	- Purchase order copy alongwith its tax invoice for the work of thermal spray coating of specified material any alloy steel grade. - Test certificate of the work carried out as per above purchase order specifying the details of coating, base material, Coating DPT results, thickness. The certificate must be duly endorsed by third party inspector or customer. - Process qualification of HVOF coating containing details of base material, coating material, hardness, bond strength, porosity and coating thickness.	
1.2	Vendor must have experience of carrying out hardfacing using arc welding (SMAW, GMAW, SAW, GTAW, PTAW) with filler material of stellite 21 (CoCr-E)/ stellite 6 (CoCr-A) / Alloy 625 (Inconel 625) over base material of high alloy steel, for e.g., X22CrMoV12-1, X10CrMoVNb9-1, X12CrMoWVNbN10-1-1, X19CrMoVNbN11-1, X13CrMoCoVNbN9-2-1, GX10CrMoVNb9-1, GX12CrMoWVNbN10-1-1, etc.	Valid WPS & PQR (Performance Qualification Record) developed by vendor for the specified filler material-base metal combination, duly endorsed by third party inspector.	
2	Manufacturing and testing Facilities Criteria:		
2.1	Vendor must have in-house facility of thermal spray coating by HVOF or detonation gun process	Details of facilities to be submitted.	
2.2	Vendor to confirm that they have adequate in-house facility for hardfacing: arc welding (SMAW / GMAW / SAW / GTAW / PTAW) and furnace of suitable size for heat treatment/PWHT.	Vendor to confirm adequacy of equipment and also provide details of arc welding and heat treatment/PWHT facility (size, maximum operating temperature, etc) to be submitted.	
2.3	Vendor must have in-house facilities for machining / surface finishing sufficient to meet the requirements of enquired items. These facilities can also be outsourced.	Details of in-house facilities to be submitted. If any of the process is outsourced, same to be specified.	

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08/12/2024

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(DWIP 24/12/24)

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05/12/24
[Signature]
Rajesh Kumar
Manager MTB

Sl.	PQR Condition	Documents to be submitted	Vendor's remarks
2.4	Vendor must have either in-house facilities or outsourced through NABL accredited laboratory for carrying out all testing on coated/hard-farced component.	Details of in-house testing facilities to be submitted. Testing requiring outsourcing through NABL accredited laboratory to be specified.	
3	Technical Criteria: In case of order placement and before start of work on actual job, Vendor to submit following documents for approval of BHEL: (1) Applicable WPS (Welding Procedure Specification), PQR (Performance Qualification Record) & WPQ (Welder Performance Qualification) as per enquired jobs, duly approved by BHEL. (2) Coating process qualification as per BHEL enquiry specification duly approved by Third party inspector. All testing required in WPS/PQR and coating process qualification should be got done through NABL accredited laboratory only.	Vendor to confirm submission of document after placement of order. Note: 1. WPS/PQR to be witnessed by BHEL. 2. In case of earlier BHEL supply experience, vendor to submit WPS/PQR witnessed by BHEL for approval.	
3.3	Vendor must confirm to supply enquiry items as per enquiry specification and drawing without any deviation	Vendor to confirm	

<i>Rupinder</i> 05/12/24 MTE	<i>Selvan - Rjmar</i> (DILIP Rjmar) TTX EATX 2.3 1 Apr. June	<i>Subhant K. Thakur</i> 03/12/2024 Subhant K. Thakur Manager (FT) WTX
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Technical Requirements:**Indent:** 20250209, 20250210, 20250211, 20250196 by AIX-T**Items:** Valve Spindle, Valve Cone

As per PQR Clause 3.1, Vendor to submit applicable WPS/PQR & WPQ for enquired job after PO placement but before start of work, duly approved by third party.

Accordingly, following WPSs are identified in the enquiry job. The same to be communicated to all the vendors for their information and preparation in case PO is awarded.

1. Indent: 20250209

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	11120230015-00	P91	Inc 625	-	-
2	11132052004-00	P91	Inc 625	-	-
3	21132252003-00	P91	Inc 625	-	-

2. Indent: 20250210

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	01132252002-00	P91	NiCr+St 6	NiCr+St 21	Inc 625
2	11132050002-00	P91	Inc 625	-	-

3. Indent: 20250211

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	11122330025-00	P91	NiCr+St 21	Inc 625	-
2	11123952003-00	P91	Inc 625	-	-
3	21120230022-00	P91	Inc 625	-	-

4. Indent: 20250196

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	11120257004-00	X22CRM0V12-1	St 21	-	-
2	11122357002-00	X22CRM0V12-1	St 21	-	-
3	11132002002-00	G17CRM0V5-10	NiCr	-	-
4	11132057002-00	X22CRM0V12-1	St 21	-	-
5	11132202002-00	G17CRM0V5-10	NiCr	St 6	St 306
6	11132257002-00	X22CRM0V12-1	St 21	-	-
7	21120202002-00	X22CRM0V12-1	NiCr	-	-

Note:

- For each filler a separate WPS is required with base material. Accordingly, if a job has mention of Filler 1, Filler 2 & Filler 3, it means, 3 separate WPSs are required for each of the hardface welding fillers with the base material.
- P91 base material includes: X10CrMoVNb9-1, X12CrMoWVNbN10-1-1, X19CrMoVNbN11-1, GX10CrMoVNb9-1, GX12CrMoWVNbN10-1-1 etc
- NiCr: NiCr-82 (E-NiCrFe-3) (PZ1 as per TLV 9974 01)
- St 21: Stellite 21 (PZ4 as per TLV 9974 01)
- St 6: Stellite 6 (PZ2 as per TLV 9974 01)
- St 12: Stellite 12
- St 306: Stellite 306 (PZ6 as per TLV 9974 01) – *substituted by St 21 as per TLV 9974 01
- Inc 625: Inconel 625 (PZ17 as per TLV 9974 01)
- NiCr+St 21: NiCr-82 as buffer layer + Stellite 21 as filler layer
- NiCr+St 6: NiCr-82 as buffer layer + Stellite 6 as filler layer
- Preheat & PHWT: Both are required as per TLV 9974 01

Technical Requirements:**Indent:** 20241143, 20250267, 20250268, 20250327, 20250269 by AIX-T**Items:** Valve Cone, Valve Spindle, Valve Seat

As per PQR Clause 3.1, Vendor to submit applicable WPS/PQR & WPQ for enquired job after PO placement but before start of work, duly approved by third party.

Accordingly, following WPSs are identified in the enquiry job. The same to be communicated to all the vendors for their information and preparation in case PO is awarded.

1. Indent: 20241143

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	11230525002-00	X22CRMV12-1	St 6	St 21	-

2. Indent: 20250267

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	11132202002-00	G17CRMV5-10	NiCr	St 6	St 306
2	21120205002-00	Cr-Mo-V (G17CRMV5-10)	NiCr	St 306	-
3	21132005004-00	X22CRMV12-1	St 21	St 6	-
4	21132036003-00	P91	NiCr	-	-
5	21132205003-00	X22CRMV12-1	St 21	St 6	-

3. Indent: 20250268

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	01132252002-00	P91	NiCr+St 6	NiCr+St 21	Inc 625
2	11132050002-00	P91	Inc 625	-	-
3	21120256053-00	P91	NiCr+St 21	-	-

4. Indent: 20250327

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	21120205002-00	Cr-Mo-V (G17CRMV5-10)	NiCr	St 306	-

5. Indent: 20250269

Sl No	Drg No	Base Mat	Filler 1	Filler 2	Filler 3
1	21122230002-00	P91	Inc 625	-	-

Note:

- For each filler a separate WPS is required with base material. Accordingly, if a job has mention of Filler 1, Filler 2 & Filler 3, it means, 3 separate WPSs are required for each of the hardface welding fillers with the base material.
- P91 base material includes: X10CrMoVNb9-1, X12CrMoWVNbN10-1-1, X19CrMoVNbN11-1, GX10CrMoVNb9-1, GX12CrMoWVNbN10-1-1, GX12CrMoVNbN9-1 etc
- NiCr: NiCr-82 (E-NiCrFe-3) (PZ1 as per TLV 9974 01)
- St 21: Stellite 21 (PZ4 as per TLV 9974 01)
- St 6: Stellite 6 (PZ2 as per TLV 9974 01)
- St 12: Stellite 12

7. St 306: Stellite 306 (PZ6 as per TLV 9974 01) – *substituted by St 21 as per TLV 9974 01
8. Inc 625: Inconel 625 (PZ17 as per TLV 9974 01)
9. NiCr+St 21: NiCro-82 as buffer layer + Stellite 21 as filler layer
10. NiCr+St 6: NiCro-82 as buffer layer + Stellite 6 as filler layer
11. Preheat & PHWT: Both are required as per TLV 9974 01

Technical Pre-Qualification Requirement (PQR) for Guide Bush

Coating Requirement: Cr₃C₂ + NiCr on Inner Diameter & Ni-Cr – (Co, Fe, Mo) on Outer Diameter

Sl. No.	Qualification Requirement	Documents to be submitted	Vendor's remarks
1	Vendor must have experience of carrying out thermal spray coating by HVOF process or detonation gun process on steel components.	Purchase order copy covering details of coating alongwith its test certificate / dispatch documents for the work of thermal spray coating Process qualification certificate of HVOF coating for above purchase order / customer acceptance certificate.	
2	Vendor must have in-house facility of thermal spray coating by HVOF or detonation gun process.	Details of in house facilities to be submitted.	
3	Vendor must have facilities (in-house / outsourced) for machining / surface finishing sufficient to meet the requirements of enquired items.	Details of in-house facilities to be submitted. In case of outsourcing, details of their sub supplier with their facility to be submitted.	
4	Coating on actual job shall be carried out after successful process qualifications. Process qualification is required for Inner diameter as well as outer diameter with applicable powders respectively as per BHEL enquiry specification. Process qualification shall be done in presence of BHEL / BHEL authorized agency.	Vendor to agree and confirm.	
5	Vendor must have testing facilities (inhouse / outsourced through NABL accredited laboratory) for carrying out all testing on coated component as per enquiry specification.	Details of in-house testing facilities to be submitted. Testing requiring outsourcing through NABL accredited laboratory to be specified.	

Rajesh Kumar / Mumpu / MTE
05/02/25
(MTE)

Siddhant
(TTX) 05/02/2025
(Drip Kumpu)
Eul TTA.

This PQR is applicable only for Valve Seat (Control Valve)

Technical Pre-Qualification Requirement (PQR) for Valve Seat & Diffuser – Indent No 20240378
(21122211002, 21122211011, 21132102002, 21132111002, 21132002003)

Sl.	PQR Condition	Documents to be submitted	Vendor's remarks
1	Experience Criteria:		
1.2	Vendor must have experience of carrying out hardfacing using arc welding (SMAW, GMAW, SAW, GTAW, PTAW) with filler material of stellite 21 (CoCr-E) / stellite 6 (CoCr-A) / Alloy 625 (Inconel 625) over base material of low alloy steel for eg, 21CrMoNi4-7, G17CrMoV5-10, 21CrMoV5-7 etc or high alloy steel, for e.g, X22CrMoV12-1, X10CrMoVNB9-1, X12CrMoVNB10-1-1, X19CrMoVNB11-1, X13CrMoCoVNB9-2-1, GX10CrMoVNB9-1, GX12CrMoVNB10-1-1, etc.	Valid WPS & PQR (Performance Qualification Record) developed by vendor for the specified filler material-base metal combination, duly endorsed by third party inspector.	
2	Manufacturing and testing Facilities Criteria:		
2.1	Vendor to confirm that they have adequate in-house facility for hardfacing: arc welding (SMAW / GMAW / SAW / GTAW / PTAW) and furnace for heat treatment/PWHT.	Vendor to confirm adequacy of equipment and also provide details of arc welding and heat treatment/PWHT facility (size, maximum operating temperature, etc) to be submitted.	
2.2	Vendor must have in-house facilities for machining / surface finishing sufficient to meet the requirements of enquired items. These facilities can also be outsourced.	Details of in-house facilities to be submitted. If any of the process is outsourced, same to be specified.	
2.3	Vendor must have either in-house facilities or outsourced through NABL accredited laboratory for carrying out all testing on hard-farced component.	Details of in-house testing facilities to be submitted. Testing requiring outsourcing through NABL accredited laboratory to be specified.	


07/05/2025
Assistant Engr. Thekum
(Manager / FT)

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(Divyanshu)
Engr. TSX

Sl.	PQR Condition	Documents to be submitted	Vendor's remarks
3	Technical Criteria:		
3.1	In case of order placement and before start of work on actual job, Vendor to submit following documents for approval of BHEL: (1) Applicable WPS (Welding Procedure Specification), PQR (Performance Qualification Record) & WPQ (Welder Performance Qualification) as per enquired jobs, duly approved by third party inspector. All testing required in WPS/PQR qualification should be got done through NABL accredited laboratory only.	Vendor to confirm submission of document after placement of order.	
3.2	Vendor must confirm to supply enquiry items as per enquiry specification and drawing without any deviation	Vendor to confirm	

<i>Siddhi (DIP dm or)</i> TTX 24/11/24	<i>[Signature]</i> 07/05/2025 Assistant Kr. Manager (F-I) WTX
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Technical Pre-Qualification Requirement (PQR) for Diffuser

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Sl.	PQR Condition	Documents to be submitted	Vendor's remarks
1	Experience Criteria:		
1.2	Vendor must have experience of carrying out hardfacing using arc welding (SMAW, GMAW, SAW, GTAW, PTAW) with filler material of stellite 21 (CoCr-E)/ stellite 6 (CoCr-A) / Alloy 625 (Inconel 625) over base material of high alloy steel, for e.g., X22CrMoV12-1, X10CrMoVNb9-1, X12CrMoWVNbN10-1-1, X19CrMoVNbN11-1, X13CrMoCoVNbNB9-2-1, GX10CrMoVNb9-1, GX12CrMoWVNbN10-1-1, etc.	Valid WPS & PQR (Performance Qualification Record) developed by vendor for the specified filler material-base metal combination, duly endorsed by third party inspector.	
2	Manufacturing and testing Facilities Criteria:		
2.2	Vendor to confirm that they have adequate in-house facility for hardfacing: arc welding (SMAW / GMAW / SAW / GTAW / PTAW) and furnace for heat treatment/PWHT.	-	
2.3	Vendor must have in-house facilities for machining / surface finishing sufficient to meet the requirements of enquired items. These facilities can also be outsourced.	Vendor to confirm adequacy of equipment and also provide details of arc welding and heat treatment/PWHT facility (size, maximum operating temperature, etc) to be submitted.	
2.4	Vendor must have either in-house facilities or outsourced through NABL accredited laboratory for carrying out all testing on coated /hard-farced component.	Details of in-house facilities to be submitted. If any of the process is outsourced, same to be specified. Details of in-house testing facilities to be submitted. Testing requiring outsourcing through NABL accredited laboratory to be specified.	

Added: 23/04/2025
(DILIP KUMAR)
64 | TTX

23/04/2025
Substant Mr. Thakur
Manager (FT)

TTX/PQR/2025/107

Sl.	PQR Condition	Documents to be submitted	Vendor's remarks
3	Technical Criteria:		
3.1	In case of order placement and before start of work on actual job, Vendor to submit following documents for approval of BHEL: (1) Applicable WPS (Welding Procedure Specification), PQR (Performance Qualification Record) & WPQ (Welder Performance Qualification) as per enquired jobs, duly approved by third party inspector. All testing required in WPS/PQR qualification should be got done through NABL accredited laboratory only.	Vendor to confirm submission of document after placement of order.	
3.2	Vendor must confirm to supply enquiry items as per enquiry specification and drawing without any deviation	Vendor to confirm	

 TTX (DIP)	 23/04/2025 Assistant Manager (KT) WTX
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Technical Instructions:

Apart from PQR, following special instruction is to be added in the indent for specific hardface welding requirements which the vendors need to confirm and submit along with the offer-

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As per PQR Clause 3.1, Vendor to submit applicable WPS/PQR & WPQ duly approved by third party for enquired jobs after PO placement but before start of work.

Accordingly, following WPSs are identified in the enquiry job. **The same to be communicated to all the vendors for their confirmation - to prepare and send for BHEL review before start of hardface welding in case PO is awarded.**

Sl No	Drg No	Base Mat	Filler 1	Filler 2
1	21132152031-00	P91	NiCr+St 6	Inc 625

Note:

1. For each filler a separate WPS is required with base material. Accordingly, if a job has mention of Filler 1 & Filler 2, it means, 2 separate WPSs are required for each of the hardface welding fillers with the base material.
2. P91 base material includes: X10CrMoVNb9-1, X12CrMoWVNbN10-1-1, X19CrMoVNbN11-1, GX10CrMoVNb9-1, GX12CrMoWVNbN10-1-1, GX12CrMoVNbN 9-1 etc
3. NiCr: NiCro-82 (E-NiCrFe-3) (PZ1 as per TLV 9974 01)
4. St 6: Stellite 6 (PZ2 as per TLV 9974 01)
5. Inc 625: Inconel 625 (PZ17 as per TLV 9974 01)
6. NiCr+St 6: NiCro-82 as buffer layer + Stellite 6 as filler layer
7. Preheat & PHWT: Both are required as per TLV 9974 01

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23/04/2025
Sushant Kr. Thakur
Manager (I/T)

Pre-Qualifying Requirements (PQR)Threaded Ring (Drg. no. - 21050256101, 21050256102)

Sl. No.	REQUIREMENT	VENDOR REMARKS
1.	Only those vendors should quote who have following machine, facilities installed & operational at their works for following operations for machining and stelling works of 'Threaded Ring' (Drg. no. - 21050256101, 21050256102). Forging of threaded ring shall be supplied to vendor for machining and stelling works, as per drawing.	Vendor to confirm.
1.A.	Vendor must have suitable toolings / facility such as Marking Table / Machine Bed etc. in good working condition, to facilitate marking of job. Vendor must have suitable facility for lifting / handling subject job.	Vendor to confirm.
1.B.	<u>Turning operation:-</u>	(a) Vendor to confirm.
1.B.i.	Lathe Machine, suitable for turning operations of Threaded Ring at different stages as per drawing, TR & scope of work requirements.	(b) Vendor to provide machine details / specification for referred operation.
1.C.	<u>Milling work:-</u>	(a) Vendor to confirm.
1.C.i.	Milling machine suitable for milling slots at 45 Degrees as per drawing, TR & scope of work requirements.	(b) Vendor to provide machine details / specification for referred operation.
1.D.	Stelling related PQR points from WT end as per Annexure-1	Vendor to confirm as per Annexure-1
2	After groove Stelling, the groove is to be machined as per "3. Contour for surface crack test" & surface testing is to be done. Thereafter, finish turning operation as per "4. Finish Contour" is to be done.	Vendor to confirm.
3	Vendor to confirm that above machines (as per pt. no. 1.B to 1.D) are available at their works & are in good working condition with capability of achieving accuracies, surface finish & tolerances as per drawing requirements. If necessary, Vendor can suggest alternate machines (other than specified in pt. no. 1.B to 1.D) for machining job with accuracies, surface finish & tolerances as per drawing, for review & acceptance by BHEL.	Vendor to confirm & submit details.
4	Vendor to confirm that all the dimensions, accuracies & surface finish of the component shall be met as per Technical Requirements & drawing.	Vendor to confirm.
5	Vendor to note that all tools, measuring equipments, technological items etc. required for manufacturing of subject item shall be arranged by vendor, in case of order.	Vendor to confirm.
6	BHEL reserves the right to verify the information provided by vendor. BHEL may also visit vendor works if so desired by BHEL. In case, the information provided by vendor is found to be false/ incorrect, their offer shall be rejected.	Vendor to note & agree.

(Nadeem Ali)
Dy. Mgr. / TTX

(Mohammad Fazalhaque)
Mgr. / NCT

(Sudeep Singh Saluja)
Sr. Mgr. / PPC-T

Technical Performance-Qualification Requirement (PQR) for Threaded Ring (21050256101, 21050256102)

Annexure 1

Sl.	PQR Condition	Documents to be submitted	Vendor's remarks
1	Experience Criteria: Vendor must have experience of carrying out hardfacing using arc welding (SMAW, GTAW, SAW, PTAW) with filler material of stellite 21 (CoCr-E)/ stellite 6 (CoCr-A) / stellite 12 (CoCr-B) / Alloy 625 (Inconel 625) over base material of high alloy steel, for eg., X22CrMoV12-1, X10CrMoVNb9-1, X12CrMoWVNbN10-1-1, X19CrMoVNbN11-1, X13CrMoCoVNbNB9-2-1, GX10CrMoVNb9-1, GX12CrMoWVNbN10-1-1, etc.	Valid WPS & PQR (Performance Qualification Record) developed by vendor for the specified filler material-base metal combination, duly endorsed by third party inspector.	
2	Manufacturing and testing Facilities Criteria: Vendor to confirm that they have adequate in-house facility for hardfacing: arc welding (SMAW / GTAW / SAW / PTAW) and furnace (at least 800 deg C temperature capacity) for heat treatment/PWHT to suit the job.	Vendor to confirm adequacy of equipment and also provide details of arc welding and heat treatment/PWHT facility (size, maximum operating temperature, etc) to be submitted.	
2.2	Vendor must have either in-house facilities or outsourced through NABL accredited laboratory for carrying out all testing on hard-farced component.	Details of in-house testing facilities to be submitted. Testing requiring outsourcing through NABL accredited laboratory to be specified.	
3	Technical Criteria: In case of order placement and before start of work on actual job, Vendor to submit following documents for approval of BHEL: (1) Applicable WPS (Welding Procedure Specification), PQR (Performance Qualification Record) & WPQ (Welder Performance Qualification) as per enquired jobs, duly approved by third party inspector. All testing required in WPS/PQR qualification should be got done through NABL accredited laboratory only.	Vendor to confirm submission of document after placement of order.	
3.2	Vendor must confirm to supply enquiry items as per enquiry specification and drawing without any deviation	Vendor to confirm	

[Signature]
09/02/2024
Vishay Kumar
Manager (WTX)

[Signature]
09/02/2024
Sushant Kr. Thakur
Manager (WTX)

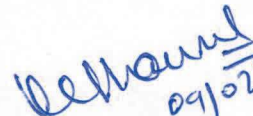
Technical Instructions:

Apart from PQR, following special instruction is to be added in the indent for welding the narrow groove in the Threaded Ring which the vendors have to submit along with the offer.

" Vendor to submit the detailed methodology/ procedure for hardface welding in the narrow groove of the enquired job (Threaded Ring). Vendor may carry out the welding trial on small Carbon steel test piece having same welding groove as of Threaded Ring and submit photographs/ video in support of this. "

BHEL reserves the right to verify the manufacturing facilities and above welding trial at the vendor works. "


09/02/2024
Sushant K. Thakur
Manager (WTX)


09/02/24
VIJAY KUMAR
Manager (WTX)