



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirapalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY

NOTICE INVITING TENDER

Phone: +91 431 257 7421/7297

Email : vkaruna@bhel.in

: hari.r@bhel.in

Web : www.bhel.com

TWO PART BID

Tender to be submitted in two Parts

Enquiry
Number:

2622000016

Enquiry
Date:

09.09.2020

Due date for submission of
quotation:

05.10.2020

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer should reach physically on or before 14.00 Hrs(IST) on the Date of tender opening. Tenders received after 14.00Hrs (IST) will not be considered for evaluation.

Item	Description	Quantity	Material Will be Delivered to
10	25 Ton Variable Speed Job Rotators as per the technical specification & commercial conditions applicable	04 Sets.	FOR, BHEL, Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014
20	100 Ton Variable Speed Job Rotators as per the technical specification & commercial conditions applicable	03 Sets.	
30	150 Ton Variable Speed Job Rotators as per the technical specification & commercial conditions applicable	02 Sets.	
40	200 Ton Variable Speed Job Rotators as per the technical specification & commercial conditions applicable	02 Sets.	
50	300 Ton Variable Speed Job Rotators as per the technical specification & commercial conditions applicable	01 Set.	

Important points to be taken care during submission of offer

- 1) Material shall be delivered to (By Indigenous vendors): As stated above.
- 2) Delivery required 6 Months (including PDI) from the date of purchase order.
- 3) Erection & Commissioning period required 1 Month from the date of intimation by BHEL to vendor for deputation of their Engineers for E&C.
- 4) EMD for this Tender will be (INR): 2,00,000.00
- 5) Compliance Forms. ATP TRY/IND/02A to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
- 6) BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) for this tender and Evaluation done on Individual item basis.
- 7) Bidders to provide Separate sealed envelope price bid for each line items they are quoting.

All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.

BHEL's General guidelines / instructions (refer MM / CE / GENL / GENL / 001 - EMD) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site www.bhel.com/tender/tender_home.php or from the Government tender website <https://eprocure.gov.in/epublish/app>) under Enquiry reference .

Tenders should be submitted before 14.00Hrs (IST) on the due date

Tenders will be opened at 14:30 hours on the due date

Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

V. Karuna 9/9/2020
DGM / Capital Equipment / MM

V. KARUNAKARAN
Dy. General Manager
Capital Equipment / MM
BHEL / Tiruchirappalli - 620 014

25 TON VARIABLE SPEED JOB ROTATORS, Qty. 4 sets**Part A**

S. No	BHEL Specification	Bidder's Response
1.0	QUALIFYING CRITERIA	
1.1	Only those Bidder / OEM who have manufactured, supplied and commissioned at least ONE 25 TON (OR) HIGHER CAPACITY VARIABLE SPEED JOB ROTATORS in the last 5 years (as on the first date of tender opening) are eligible to quote.	
1.2	Bidder has to submit at least ONE Performance Certificate from their customer (end user), for satisfactory performance of 25 TON (OR) HIGHER CAPACITY VARIABLE SPEED JOB ROTATORS meeting the following conditions: a) The Equipment must have been supplied within the last 5 years as on the first date of tender opening. b) The Equipment must have performed satisfactorily for at least one year during this period. For obtaining the Performance certificate, a suggestive format is provided at the end of part-A.	
1.3	PO document for the above mentioned supplied equipment to be enclosed	
1.4	BHEL reserves the right to verify the information provided by the Bidder. In case the information provided is found to be false/ incorrect, the offer is liable for rejection.	
2.0	INFORMATION TO BE PROVIDED BY BIDDER	
2.1	Bidder shall provide contact details(phone no & email id) including the address of his Agents / Service Centres in India	
2.2	Details of VARIABLE SPEED JOB ROTATORS supplied to other BHEL units if any	
2.3	The BIDDER to furnish Reference List of Customers(max 10 customers) including Contact details(phone no & email id).	
3.0	The BIDDER to note:	
3.1	The BIDDER shall submit the offer in Two Parts – 1. Technical [with PART A & PART B] & Commercial and 2. Price Bid.	

S. No	BHEL Specification	Bidder's Response
3.2	The Bidder's offer against each clause in PART A & B of the offer should be filled by the BIDDER compulsorily with complete details.	
3.3	The BIDDER shall assure a continuous support for Spares and Service for Ten Years, from the date of commissioning of the equipment at BHEL Works.	
3.4	The Technical Offer shall be supported by Product Catalogue and Data Sheets in original and complete technical details / literature on the quoted equipment.	
3.5	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation.	

Suggestive Format of Performance Certificate:

The performance certificate to be produced **on Customer's Letter Head.**

PERFORMANCE CERTIFICATE

- | | | |
|---|--|---------------------------------|
| 1 | Make of the equipment | |
| 2 | Month & Year of Commissioning | |
| 3 | Application for which the equipment is used | |
| 4 | Capacity of the equipment in Tons | |
| 5 | Variable Speed Type
(Strike off whichever is not applicable) | Yes/No |
| 6 | Performance of the equipment
(Strike off whichever is not applicable) | Satisfactory / Not Satisfactory |
| 7 | Service support after sales
(Strike off whichever is not applicable) | Satisfactory / Not Satisfactory |
| 8 | Any Other remarks | |
| 9 | This performance certificate was issued on: (DD/MM/YYYY) | |

Authority	Signature & Seal of the Issuing the Performance Certificate
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Contact details of issuing authority
Name & Designation:
Office No/ Mobile no:
Email ID:

25 TON VARIABLE SPEED JOB ROTATORS, Qty. 4 sets

Part B - Technical Specification

S No.	BHEL SPECIFICATIONS		Bidder's OFFER with technical details
1.0	APPLICATION: The job rotators are required for use in heavy fabrication of Pressure Vessels and Heat Exchangers which are cylindrical in shape and welded with attachments and nozzles. The requirement of 4 sets consists of the following combination:- a) 25 Ton Capacity Variable Speed Job Rotator (2 Sets) - Each set consisting of <u>Drive unit – 1 no. & Idler unit – 1 no.</u> b) 25 Ton Capacity Variable Speed Job Rotator (2 Sets) - Each set consisting of <u>Drive unit – 1 no. & Idler unit – 2 nos.</u> Outer Diameter Range of Job (approx.): 400 to 4000 mm	Bidder to note and confirm	
2.0	Design, Manufacture and supply of the equipment alongwith proveout and training at BHEL works as per BHEL specifications shall be in Supplier's scope	Bidder to confirm	
3.0	TECHNICAL PARAMETERS		
3.1.0	DRIVE UNIT		
3.1.1	Rotating Capacity of each Drive Unit: 25 Metric Ton minimum	Bidder to confirm	
3.1.2	Weight Carrying Capacity of each Drive unit: 12.5 Metric Ton minimum	Bidder to confirm	
3.1.3	Eccentric Loading: 20 % of the maximum Weight carrying capacity	Bidder to confirm	
3.1.4	Job rotation shall be in Both Clockwise and Anti clock wise direction. The rotation shall be uniform and without any jerks/interruption	Bidder to confirm	
3.1.5	Wheel Surface Speed range: 50 to 1200 mm / minute (approx.), with step less speed variation.	Bidder to specify	

S No.	BHEL SPECIFICATIONS	Bidder's OFFER with technical details
3.1.6	Drive units shall be with Electric AC Motor with Variable frequency drive of suitable capacity, energy efficient class IE2 conforming to IS standard.	Bidder to confirm and provide details along with the motor rating in kW
3.1.7	Both wheels of the drive unit shall be electrically driven i.e. Each drive unit shall comprise of 2 sets of motors with gear boxes and a VFD	Bidder to confirm
3.1.8	Electric motor make: ABB / SIEMENS / CROMPTON GREAVES / HINDUSTAN / BHARAT BIJLEE / KIRLOSKAR or any other make acceptable to BHEL.	Bidder to confirm and provide details
3.1.9	VFD make: ABB / SIEMENS/ MITSUBISHI / YASKAWA / TOSHIBA / PARKER / SCHNEIDER / AMTECH or any other make acceptable to BHEL.	Bidder to confirm and provide details
3.1.10	Variable frequency drive: Total harmonic distortion values for current and voltage, introduced by the drives shall be within allowable limits.	Bidder to confirm and provide details
3.1.11	Gear Box Details: BIDDER to furnish complete technical details of the Gear Box used for mechanical power transmission. a) Only standard gear boxes to be used rather than built in gear boxes. Planetary Gears are not permitted. b) Worm reduction Gear Box for minimum backlash, shall be of reputed make like PREMIUM/GREAVES / ELECON / BONFIGLIOLI / RADICON / NEW ALLENBURY / SHANTI GEARS or any other make acceptable to BHEL. c) Oil level in gear box should be visible through a transparent glass for refilling purpose.	Bidder to confirm and provide details
3.2.0	Operator Panel and Controls: Main control panel and remote control pendent with the following features to be provided.	

S No.	BHEL SPECIFICATIONS	Bidder's OFFER with technical details
3.2.1	The Main Control Panel shall have the following features: a) A suitable capacity MCB as Main switch for On/ Off. The MCB shall be operable without opening the control panel door. b) Indication lamp for the indication of Main On / Power On, Drive Trip. c) Emergency Stop Push button. d) 2 - way selector switch for rotator Forward / Reverse selection. e) A single turn Potentiometer for setting the RPM. f) Local / Remote selector switch. g) Sufficient capacity Cooling fan with required Air filter. h) Push button for Drive Reset i) Programmable Digital RPM Meter j) Rotation ON and Rotation OFF switch k) Digital display for showing surface speed of wheel and RPM l) All the controls, switchgear and drive of the rotator shall be housed in a compact IP54 grade enclosure of RITTAL make or equivalent. It shall be preferably mounted at a convenient location on the base frame of the rotator m) No component should be mounted on the bottom surface of the control panel.	Bidder to confirm
3.2.2	A hand held remote unit (24 Volt dust tight Remote control pendant) with the following features has to be provided: a) Remote ON / OFF selector switch. b) Single turn Potentiometer for speed variation. c) Emergency Stop Push button. d) 2-way selector switch for rotator forward / reverse operation. e) Rotation ON and Rotation OFF switch f) Digital display for showing surface speed of wheel and RPM	Bidder to confirm

S No.	BHEL SPECIFICATIONS		Bidder's OFFER with technical details
	The remote cable shall be connected to the Main control panel through easily detachable Plug & sockets and length of the connecting cable shall be 15 mtrs . The cable shall be housed in heavy duty metallic conduit with PVC sheath of LAPP make or equivalent and suitable provision shall be provided on the rotator to wind and keep the remote cable safely when the remote is not in use. Provision shall be provided near the control panel/on the rotator for suitably mounting the pendant after use.		
3.3.0	IDLER UNIT: The Idler unit should be identical in all aspects with the Drive unit except that it shall have no drive mechanism. Idler should have the following Features:		
3.3.1	Weight Carrying Capacity of each Idler unit : min. 12.5 Metric Ton.	Bidder to confirm	
3.3.2	Eccentric Loading: 20 % of the maximum Weight carrying capacity.	Bidder to confirm	
3.3.3	Welding return cable connection on the positioner: Suitable arrangement to be provided on the idler unit for connecting the welding return cables and to ensure the proper conductivity of welding current through job, rotator wheels to the welding machine. The maximum welding current to be carried is 1200A.	Bidder to confirm	
3.4.0	FEATURES Common for Drive & Idler units:		
3.4.1	Outer Diameter Range of Job (approx.): 400 to 4000 mm	Bidder to specify	
3.4.2	Size of Wheel (Diameter X Width (approx.): 500 X 140 mm	Bidder to specify	
3.4.3	Bidder to specify the height of roller top most point from shop floor level.	Bidder to specify	
3.4.4	Wheel Material : Solid Steel Forging.	Bidder to confirm	
3.4.5	Wheel Contact Surface Hardness : 300-350 BHN	Bidder to confirm	
3.4.6	Wheel Surface Profile: Crowning Surface with an angle of 3 degrees	Bidder to confirm	
3.4.7	Wheel Pitch Adjustment: Each wheel assembly with Housing/Bracket and Integral Drive Unit shall be movable on the Rotator Base Frame, through a manually driven screw-rod in Drive & Idler Unit. It shall be	Bidder to confirm and provide details of pitch and locking	

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	possible to position and lock each wheel assembly on the Rotator Base Frame at required pitches (preferably 100 mm) to cover the job diameter range. The drive arrangement to be designed to avoid loading on the screw-rod while loading / after loading the job on the wheels.	arrangement	
3.4.8	Wheel Alignment: The alignment of the wheel face in the plane perpendicular to the wheel shaft axis to be maintained within 1mm for the entire stroke of the wheel assembly positions on the base frame.	Bidder to confirm	
3.4.9	Wheel Positioning: There shall be suitable arrangement for locking the wheel assembly with the base frame, to prevent movement under working/loaded conditions. Locking pins may be of EN24 with 40- 45 HRC or better	Bidder to provide details	
3.4.10	Wheel Support: Wheels are to be supported on Heavy Duty Roller Bearings (Preferably double side sealed) of TIMKEN / FAG / SKF make or any other make acceptable to BHEL.	Bidder to provide details	
3.4.11	Hardness and finish of Base frame slide: The sliding surfaces of the base frame in Drive & Idler units shall be hardened and machined.	Bidder to confirm	
3.4.12	Cover for Gears: Suitably profiled dismantling type of steel outer-covers are to be provided for the spur gears, to protect from welding flux, slag and other foreign materials, while in operation. The thickness of the cover plate shall be minimum 2mm. Bidder to ensure that these covers should not interfere with job while rotating.	Bidder to confirm	
3.4.13	Cover for base frame: Suitably profiled dismantling type of steel covers are to be provided to cover the sliding surface (top face) of the base frame, to protect from welding flux, slag and other foreign materials falling on it, while in operation. The thickness of the cover plate shall be minimum 2mm.	Bidder to confirm	
3.4.14	Lifting: Provision to be provided at 4 suitable locations for lifting the entire rotator unit by EOT Crane in a geometrically balanced state.	Bidder to confirm	

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3.4.15	Anti-skew arrangement	Bidder to confirm and provide details	
4.0	STRUCTURAL FABRICATION		
4.1	Rotator Base Frame and Heavy Wheel Bracket / Housing: Steel Fabrication Procedures to be followed. The Base Frame work shall be with steel plates of sufficient thickness, including REINFORCING RIBS. Bidder to provide the load calculation details for the selected thickness of Base frame, Side plates, ribs and diameter of the screw rod.	Bidder to confirm and provide details	
4.2	Raw Material: Only certified steel plates shall be used for fabrication. Test Certificates to be produced for BHEL verification and it forms part of the documentation.	Bidder to confirm	
4.3	Welded Joints: No Butt Joints are allowed for Plate Build-Up to increase effective length.	Bidder to confirm	
4.4	Welding Electrodes: For all Welding E 7018 Electrode/higher grade shall be used.	Bidder to confirm	
4.5	Welded Joint Testing: All Fillet Welded Joints shall undergo Non Destructive Testing like Liquid Penetrant Test (LPI) and Magnetic Particle Inspection (MPI). Testing Documents to be produced for BHEL verification and forms part of the documentation.	Bidder to confirm	
4.6	Heat Treatment: The Structural Items (Base Frame / Wheel Housing, etc.) shall be Stress Relieved by thermal heat-treatment process after welding and NDT examinations.	Bidder to confirm	
4.7	Machining Operation: All mechanical mating sliding surfaces are to be machined and ground to the required finish after heat treatment.	Bidder to confirm	
4.8	Surface Cleaning: All steel parts are to be shot blasted or chemically treated for surface cleaning, after completion of all operations but prior to painting.	Bidder to confirm	

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5.0	OTHER POINTS		
5.1	415V $\pm$ 10%, 50HZ $\pm$ 3%, 3 Phase AC (3 wire system without neutral), Power Supply will be provided by BHEL at a single point near the turning rolls, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the turning rolls/control cabinets, shall be the responsibility of vendor.	Bidder to confirm	
5.2	Power supply cable shall be of flexible copper and suitable capacity with 4 core (one for earth) of length 15 mtrs with flexible rubber conduit for mechanical protection to be provided.	Bidder to confirm	
5.3	All electrical & electronic control cabinets & panels should be dust, heat and vermin proof	Bidder to confirm	
5.4	No component should be mounted on the bottom surface of the control panel.	Bidder to confirm	
5.5	Motors and other the electrical components shall be properly earthed.	Bidder to confirm	
5.6	Inter connecting cables with connectors duly protected from heat / damages during use.	Bidder to confirm	
5.7	All the electrical components shall be mounted on 'DIN rail'	Bidder to confirm	
5.8	Control Voltage: The control Voltage shall be 24 V AC / DC keeping in view operator safety.	Bidder to confirm	
5.9	Markings/Indications to be provided on Rollers: a) A scale to be fixed on the base frame to identify the range of job diameters that can be loaded at that particular pitch. b) The rotating and bearing capacities to be mentioned clearly on the Drive or Idler. c) Also, Self-weight of the rotators should be painted legibly for lifting purpose. The same should be punched on name plate on the job rotator.	Bidder to confirm	

S No.	BHEL SPECIFICATIONS		Bidder's OFFER with technical details
5.10	Shrink disc of suitable capacity Make: Precision transmatic devices or equivalent.	Bidder to specify	
5.11	BOTH DRIVE AND IDLER LEAD SREWS SIZE shall be EN8 material TR70X10P with suitable hardness or better.	Bidder to specify	
5.12	GEARS/PINIONS may be EN8 with 28- 32 HRC or better.	Bidder to specify	
6.0	WORKING ENVIRONMENT		
6.1	Job Temperature: The ROTATORS will be used in the Fabrication Shop floors, where the jobs are pre-heated / post-heated to a temperature of maximum 300 °C and hence the mechanical parts coming in contact with the jobs are to be designed to withstand this high temperature.	Bidder to confirm	
6.2	Ambient Condition: Indoor Working Environment with temperature up to 50 Deg C and Humidity up to 85%, but both do not occur simultaneously.	Bidder to confirm	
7.0	Painting: The Job Rotators are to be painted as follows: a) One coat of Primer (Zinc Chromate) with 25 microns of DFT (Dry Film Thickness) and 48 hours of compulsory curing after painting. b) Two coats of Enamel Paint [Colour Apple Green] each with a DFT of 25 microns and intermittent curing of 16 hours. c) Weight carrying capacity & Self weight shall be painted legibly on each unit.	Bidder to confirm	
8.0	SPARES: BIDDER to Quote for spares as mentioned below:- a) Bearings for each wheel assembly – 1 Set b) Gears/Pinions – 1 Set c) Shrink Disc- 2 Nos. d) Box Nut – 1 Set e) Pulleys & Couplings used in the Rotator - 1 Set f) Variable Frequency Drive - 1 No.	Bidder to provide a separate un priced complete list of spares	

S No.	BHEL SPECIFICATIONS	Bidder's OFFER with technical details
	g) Selector switches- 2 Nos. in each type h) Push-buttons - 2 Nos. in each type i) Potentiometer- 2 Nos. in each type Bidder to quote item wise unit price in price bid offer.	
9.0	ACCESSORIES/TOOLS: The following Electrical maintenance accessories 1 Set to be supplied:- a) Hand wheel/ Ring spanner for driving the lead screw for pitch adjustment of wheels – 4 Nos. b) Electrical maintenance Tool kit (KENNEDY make, 46-piece ratchet screwdriver bit and socket set, Order code: KEN5736360K) - 2 Nos c) MOTWANE / FLUKE make digital Multimeter – 2 Nos. d) Mechanical tool kit with Ratchet box spanner kit (1", ½", ¾", ¼") Heavy duty Tapania make – 1 set	Bidder to confirm
10.0	Drawings / Documents / Details:	
10.1	Drawings and Documents after receipt of P.O.: The following documents and details are to be submitted for BHEL Approval, within one month after the receipt of PO - prior to taking up the manufacture of the ROTATORS. BHEL shall approve the drawings within 2 weeks' time: a) GA Drawing of the ROTATOR. b) GA Drawing of Wheel Drive Mechanism. c) GA drawing of wheel shifting mechanism in Drive Units. d) GA Drawing of Electric/Electronic System. e) Sub-Assembly Drawing for Wheels. f) Calculations for Selection of Electric Motors, Gear Reducers, etc. g) Wiring Diagram with Logic Circuits. h) Weight of the ROTATOR (Drive & Idler Unit) including all Electrical Equipment. Note: All the drawings should have the major & critical dimensions and	Bidder to confirm

S No.	BHEL SPECIFICATIONS	Bidder's OFFER with technical details
	list of bought out items with make and specification	
10.2	Drawings and Documents along with Equipment supply: Each ROTATOR set shall be provided with THREE Copies of Erection / Assembly, Operation & Maintenance Manual, containing the following technical details: a) General Arrangement and Sub-assembly Drawings b) Electrical Wiring Schematics c) Detailed Wiring Diagrams for Control Panels and Remote Control d) Rotator Wheel Sub- Assembly Drawing e) Gear Box Details / Drawings. f) Specifications / Ratings of Bought-Out Items g) VFD drive Programming / User manual h) VFD drive Parameter manual i) Mechanical manufacturing drawings for all wearing components. (Screw rod, box nut, drive pinion, gears, bushes, etc.) j) Operation & Maintenance manual with complete specification of the equipment and Preventive Maintenance check list. <u>Note:</u> 1. One soft copy of the entire documents stated above to be provided in Pen drive/CD. 2. One Hard copy and one soft copy to be submitted at the time of inspection at suppliers works for checking the sufficiency of the documents. If any additional requirements are found needed for maintenance, it should be provided.	Bidder to confirm
11.0	Pre Dispatch Inspection: Supplier to call BHEL for inspection before dispatch. The following Schedule of Inspection is to be carried out, prior to dispatch from the Supplier's Works: a) Verification of Test Certificate for Raw Materials & Bought-Out Items	Bidder to confirm

S No.	BHEL SPECIFICATIONS		Bidder's OFFER with technical details
	used. b) Random Testing on the Welds, by physical examination and NDT c) Wheel alignment as per this specification. d) Idle Run Test and Test under simulated conditions (on mutually agreed basis) e) Verification of O&M Manuals. PDI charges if any shall be quoted by the bidder separately in their offer		
12.0	Commissioning: Assembly and Commissioning of the ROTATOR and Performance Prove – Out for Carrying & Rotating Capacity and Smooth Functioning of the ROTATOR (at BHEL Works) shall be the RESPONSIBILITY of the Technical Representative of the Supplier.	Bidder to confirm	
13.0	Training: The supplier's representative shall give necessary training to Operators & Maintenance persons on Operation & Maintenance of the Unit.	Bidder to confirm	
14.0	Guarantee: 12 Months from the date of commissioning at BHEL works or 18 Months from the date of dispatch whichever is earlier	Bidder to confirm	
15.0	The following to be necessarily enclosed with the offer:		
15.1	a) GA Drawing of Drive and Idler units with important Dimensions and BOM b) GA Drawing of Wheel Drive Mechanism with important Dimensions and BOM c) Wiring Diagram with Logic Circuits and BOM d) Main control unit and Handheld remote unit layout drawings. e) Technical Catalogue.	Bidder to comply	