

| Ballot   | 6330  | Name                    | API 670, 6th Edition    |           |                  | Report Date:   | 3/23/2024  | Closing Date   | 5/5/2024   |                 |
|----------|---|-------------------------|-------------------------|-----------|------------------|--|--|--|------------|-----------------|
| Proposal | This ballot is on the proposed API Std 670, 6th Edition, Machinery Protection Systems. Be sure to examine the document carefully and thoroughly, also checking for accuracy with any cited references, cross references, descriptions, terminology, and values. |                         |                         |           |                  |  |  |  |            |                 |
| Sort Key | Name  | Vote                    | Clause Subclause Number | Paragraph | Type of Comments | Comments   | Proposed Change  | Comment Resolution   | Attachment | Company         |
| 5        | Richard Dow   | AffirmativeWith Comment | 2                       | 2         | General          | References are missing 619 and 677.  | TF to considr including.   | Not Accepted - No references to these standards                                    |            |                 |
| 1        | R. Daryl Taylor   | AffirmativeWith Comment | 2                       | 2.1       | General          | API 613 and Schneider Electric PI-MBUS-300 are not used in the document. API 611, 616, 617, 618, 684 appear to be used informatively only  | Review the entire Normative Reference list to be sure the references are used and that they are used normatively   | Accepted. API editors will screen for normative references.                        |            |                 |
| 4        | Mantosh BHATTACHARYA  | NonVoter                | 2                       | 2.1       | General          | Kindly add the revision / edition detail for API standards. API RP 684 has been replaced by API TR 684   | ADD revision / edition number such API 617 9th edition   | Accepted   |            | Petrofac        |
| 8        | Bob Eisenmann   | AffirmativeWith Comment | 2.1                     | 2.1       | General          | Schneider Electric PI-MBUS-300,13 Modbus® Protocol Reference Guide: This seems more suitable in the bibliography. I don't see how this is normative.   |  | Accepted   |            | BP America, Inc |
| 2        | Bob Eisenmann   | AffirmativeWith Comment | 2                       | 2.2       | General          | No specific standard is given.   | Specific normative references are required if there are any.   | Accepted in Principle. 2.2 will be deleted and normative references will be added. |            | BP America, Inc |
| 6        | Richard Dow   | AffirmativeWith Comment | 2.1                     | 2.1       | General          | Missing references to 619 and 677.   | TF to consider adding in.  | Not Accepted - No references to these standards                                    |            |                 |
| 7        | Bob Eisenmann   | AffirmativeWith Comment | 2.1                     | 2.1       | General          | API 684 is listed as a normative reference. Today's version is a technical report and not a recommended practice. In itself it is not-normative, but it does contain special paragraphs that have normtive language. This reference has a different title from the one I have, which is 'API Standard ParagraphsRotordynamic Tutorial: Lateral CriticalSpeeds, Unbalance Response,Stability, Train Torsionals, and RotorBalancing' | Update reference and consider whether this should or can be a normative reference.   | Accepted   |            | BP America, Inc |
| 3        | Bob Eisenmann   | AffirmativeWith Comment | 2                       | 2.4       | General          | This seems out of place.   |  | Accepted. 2.3 has been deleted   |            | BP America, Inc |
| 11       | Bob Eisenmann   | AffirmativeWith Comment | 3                       | 3.1.13    | General          | The definintion for best fit straight line is not typical. Usually, this is taken as a regression line that minimizes the sum of the squares of the residuals.While this can be done, computationally, it is more difficult. Standard statistical tools and spreadsheets can perform the regression fit, even calculators.   | Change the definintion to what is commonly recognized as a best fit line.Usually, the word straight is omitted, too.   | Accepted in Principle. Task force will update paragraphs                           |            | BP America, Inc |
| 12       | Bob Eisenmann   | AffirmativeWith Comment | 3                       | 3.1.39    | General          | The definition for finite life says that components are designed to fail under normal operating ,and ... There may be some equipment that is designed to fail in normal operating conditions, this does not seem to be the normal case.  | Perhaps a better defintion would say the expeced lifespan or functioningof the component is limited or bounded omstead of designed to fail. The balance of the definition on obsolesence seems reasonable. | Accepted. Definition has been revised.   |            | BP America, Inc |

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| 13 | Bob Eisenmann | AffirmativeWith Comment | 3 | 3.1.42              | Technical | The acceleration of gravity in U.S. customary units is given as 386.4 ips. To one decimal place this should be 386.1. Since this is used for measurement and calibration in a MPS this should be changed. While this value is commonly seen, it is not accurate.  | Update the U.S.C value to 386.1 in./s <sup>2</sup> .The value is close to 386.0886 in/s <sup>2</sup> , not 386.4.  | Accepted. Definition has been revised.   |  | BP America, Inc           |
| 14 | Bob Eisenmann | AffirmativeWith Comment | 3 | 3.1.62              | Editorial | Definition for overall. It would be better to define overall vibration or overall signal, because the document uses the term overall for different meanings and in various contexts.  | Define overall vibration or signal instead of overall.   | Accepted. Updated to show overall vibration  |  | BP America, Inc           |
| 20 | Bob Eisenmann | AffirmativeWith Comment | 6 | 6.10.3<br>6.10.4 b) | General   | 6.10.3 appears to desire synchronization to the master clock--language could be clearer if this is the intent. 6.10.4 b) wants to be able to set the internal clock through the digital communications port. This seems like a logical conflict.  | Ensure the logical agreement between clauses 6.10.3 and 6.10.4.  | Not Accepted. 6.10.3 explains what the internal clock shall be synchronized, 6.10.4.b) defines the capability for remote digital sync. |  | BP America, Inc           |
| 71 | Brian Howard  | NonVoter                | 6 | 6.10.6              | Editorial | This could be confusing to many people. The Alarm time delay is used for determining if a measurement has exceeded a setpoint for a determined amount of time. Later in the document the time delay for the persistence of a measurement is specified to be between 1 and 3 seconds to determine an alarm state. The statement as it stands says the alarm detection should not exceed 100 ms. See suggested change for more information. | d) With exception of electronic overspeed detection (see Note 1), the time required to detect that a measurement has exceeded an alarm or a shutdown setpoint shall not exceed 100 ms. Alarm determination and a resulting relay actuation and the machinery protection system's annunciation of the condition shall be fixed by the time delay specified in 7.1.1.6 a). | Accepted in Principle. Updated paragraph   |  | Bently Nevada Corporation |
| 21 | Bob Eisenmann | AffirmativeWith Comment | 6 | 6.10.6 d)           | General   | 100 ms time to detect and initiate shutdownNote 1 is added but not part of the requirement. Are there intended limitations, such as for axial position, where the time constant will affect the ability to detect and initiate a shutdown?  | Review and clarify the requirement as necessary. Also, provide a realistic requirement for axial position and all shutdowns for timing from the adverse event.   | Not Accepted. No proposal submitted. Standard as-written is sufficient.  |  | BP America, Inc           |
| 43 | Brian Howard  | NonVoter                | 6 | 6.10.6.h)           | General   | Bypass of channels may lead to a complete bypass of a critical protective function  | If specified, a tamperproof means for bypassing the shutdown function (except for ODS) and a visible indicator shall be provided for each channel (bypass functions subject to OEM approval)   | Not Accepted. Exception can be called if wanted.   |  | Bently Nevada Corporation |
| 42 | Brian Howard  | NonVoter                | 6 | 6.11.4              | Technical | Depending on MPS vendor, some relays options are not available  | If specified, either of the following relay types may be provided in lieu of epoxy-sealed relays (via interposing relay, if needed)  | Not Accepted. Can take exception if needed.  |  | Bently Nevada Corporation |
| 41 | Brian Howard  | NonVoter                | 6 | 6.11.6              | Technical | Simplified version of statement included in par 4.12.5 of 5th edition, that was also including a note related to SIF ( ... except for overspeed channels and/or functional safety requirements that preclude the use of energize-to-shutdown relays.)   | If specified, the relay control circuit shall be field changeable to be either normally de-energized or normally energized (except for ODS or functional safety requirements that may preclude the use of energize-to-shutdown relays).  | Not Accepted. Justification not required in standard.  |  | Bently Nevada Corporation |

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| 47 | Brian Howard         | NonVoter                | 6    | 6.11.8     | Technical | for some rotating equipment (eg. aeroderivative engines) alarms and shutdown aren't latched since other high vibration avoidance logics (step to a low core speed) is best suited to clear the high vibrations. A shutdown from a SIS is generated if the vibrations don't get back to acceptable values. | Shutdown, alarm, and circuit-fault relays shall be field changeable to latching (manual reset) or nonlatching (automatic reset). Latching shall be standard except for aeroderivative engines where a fast deceleration to low speeds can be made to bring the vibration levels down to OEM acceptable levels A delayed shutdown from a SIS shall be provided if the high vibrations persist. | Not Accepted. Too specific to one equipment type.                                      |  | Bently Nevada Corporation |
| 73 | Mantosh BHATTACHARYA | NonVoter                | 6.13 | 6.13.1 (g) | Technical | add after - 6.13.1 (g) as 6.13.1 (e) - Effect of 2-way radio (walkie talkie) near the machinery   | -2-way radio (walkie talkie) near the equipment and switch from listen to talk mode, there may be vibration spike and the unit shall trips as a result. This is a repetitive effect. 2 way radio set , operation mode and prohibitive distance should be advised by Sensor supplier   | Not Accepted.  |  | Petrofac                  |
| 53 | Bill Robichaux       | AffirmativeWith Comment | 6    | 6.13.2.1   | Technical | include requirement for external supports of conduit to be considered rigid against movement to prevent damage in the field.  | Add c) the conduit shall be supported rigidly prevent damage from excessive movement, shaking, vibration, physical contact and/or other extreme conditions to prevent damage to the conduit or signalling wire in field applications.   | Not Accepted. Comment too vague.   |  | Shell                     |
| 22 | Bob Eisenmann        | AffirmativeWith Comment | 6    | 6.15.4     | General   | The event list should be accessible to the user. The way this is written there could be no access to this list, except perhaps by the manufacturer for their legal protection.  | Add c) requiring this list be available to the user.  | Not Accepted.  |  | BP America, Inc           |
| 61 | R. Daryl Taylor      | AffirmativeWith Comment | 6    | 6.16       | Technical | MPS equipment should be field proven. Reliability clauses from Std Paragraphs should be included.   | Include 6.1.1.1; 6.1.1.2; 6.1.1.3; 6.1.4; 6.1.4.1 from APISPR2024.  | Not Accepted. 6.16.2 provide sufficient coverage                                       |  |                           |
| 62 | R. Daryl Taylor      | AffirmativeWith Comment | 6    | 6.17.1     | Technical | "and shall be chemically resistant as specified in 6.4" seems odd here. The sentence describes the parts of the system, not system requirements. As stated, chemical resistance is covered in 6.4 and does not need to be repeated or referenced here.  | Delete the phrase "and shall be chemical resistant as specified in 6.4".  | Accepted.  |  |                           |
| 23 | Bob Eisenmann        | AffirmativeWith Comment | 6    | 6.17.1.1.1 | General   | approximately 25 mm (1 in.) in length. This is not measurable, not can one be certain what will be supplied.  | Provide a requirement for length with a tolerance that is both measurable and practical.  | Not Accepted. As-written to avoid excluding some OEMs.                                 |  | BP America, Inc           |
| 63 | R. Daryl Taylor      | AffirmativeWith Comment | 6    | 6.17.1.3   | Technical | What about extension cables for 5 mm probes?  | Include requirements for 5mm probes   | Accepted.  |  |                           |
| 64 | R. Daryl Taylor      | AffirmativeWith Comment | 6    | 6.17.1.5   | Technical | What about oscillator-demodulators for 5mm probes?  | Include requirements for 5mm probes   | Accepted.  |  |                           |
| 34 | Bob Eisenmann        | AffirmativeWith Comment | 6    | 6.17.1.5.5 | Editorial | The note in this section contains a 'may'. No permission is being given to have notice.   | Reword  | Accepted. Revised note to use might  |  | BP America, Inc           |
| 65 | R. Daryl Taylor      | AffirmativeWith Comment | 6    | 6.17.2.2   | Editorial | 3 requirements in 1 clause  | separate the requirements (maybe use an a) b) c) list.  | Not Accepted. Shalls relate to same item.  |  |                           |
| 66 | R. Daryl Taylor      | AffirmativeWith Comment | 6    | 6.17.2.5   | Technical | the term "separate" implies that a passive sensor could be used along with the active sensor. Why do this?  | Delete "separate"   | Accepted. Replaced separate with additional. Passive probes preferred for reliability. |  |                           |

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| 74 | Mantosh BHATTACHARYA | NonVoter                | 6.17.3.3<br>Casing/Housing Transducers | 6.17.3.1    | Technical | Add - one separate clause for water proof accelerometer for measurement of casing / column pipe vibration for vertical long shaft pump .   | 6.7.3.1.16 - underwater vibration testing and measurement caused by resonance or unsteady fluid flow. The waterproof accelerometers and can be used to measure and identify structural vibration, cavitation,.   | Not Accepted. Application too specific                                 |  | Petrofac                  |
| 33 | Bob Eisenmann        | AffirmativeWith Comment | 6                                      | 6.17.3.1.1  | General   | This clause only states what the standard accelerometer is, not what is allowed or prohibited.The standard covers accelerometers but   | Consider specifying allowable accelerometer types.   | Noted. Out of scope for this edition                                   |  | BP America, Inc           |
| 32 | Bob Eisenmann        | AffirmativeWith Comment | 6                                      | 6.17.3.1.7  | General   | In addition to the requirents here there should be a flatness requirement. Waveyness of the surface could have a great affect on the tansducer.                                    | Consider and implement a flatness requirement suitable for casing mounted transducers.   | Not Accepted. Not necessary  |  | BP America, Inc           |
| 54 | Bill Robichaux       | AffirmativeWith Comment | 6                                      | 6.17.3.1.7  | Technical | You must address the machined surface so that it does not reduce the wall thickness of the mounting surface (e.g. pressure retaining boundry, split-line flange thickness, etc...) | The mounting surface shall not reduce the wall thickness by spot facing to create trhe flat surface. It is perferrable to have a raised faced boss for all accelerometer installations.  | Not Accepted. Beyond scope of standard                                 |  | Shell                     |
| 48 | Brian Howard         | NonVoter                | 6                                      | 6.17.3.1.9  | Technical | For some specific engines design and stud arrangement (e.g., aero-derivatives), the mounting holes are 1/4-18 NPT thread and not double-ended.                                     | The vendor shall supply with each velocity sensor a standard mounting option consisting of a double-ended, flanged, 1/4-28-UNF-2A threaded, AISI Standard Type 300 stainless steel mounting stud. 1/4-18 thread (flush mounted, not double-ended) is admissible on eroderivative engines (see Figure C.2 for an example of this arrangement) | Not Accepted. Too specific to one equipment type.                      |  | Bently Nevada Corporation |
| 31 | Bob Eisenmann        | AffirmativeWith Comment | 6                                      | 6.17.3.2.2  | General   | Add a tolerance to make the length measurable and practical.   | Add a tolerance to make the length measurable and practical.   | Not Accepted   |  | BP America, Inc           |
| 67 | R. Daryl Taylor      | AffirmativeWith Comment | 6                                      | 6.17.3.3    | Editorial | several clauses contain multiple requirements  | separate the requirements. It may be useful to gather all of the requirements into a numbered list   | Not Accepted. Shalls relate to same item.                              |  |                           |
| 50 | Brian Howard         | NonVoter                | 6                                      | 6.17.3.3.10 | Technical | For some specific engines design and stud arrangement (e.g., aero-derivatives), the mounting holes are 1/4-18 NPT thread and not double-ended.                                     | The vendor shall supply with each velocity sensor a standard mounting option consisting of a double-ended, flanged, 1/4-28-UNF-2A threaded, AISI Standard Type 300 stainless steel mounting stud. 1/4-18 thread (flush mounted, not double-ended) is admissible on eroderivative engines (see Figure C.2 for an example of this arrangement) | Not Accepted. Too specific to one equipment type.                      |  | Bently Nevada Corporation |
| 30 | Bob Eisenmann        | AffirmativeWith Comment | 6                                      | 6.17.3.3.2  | General   | Since moving coil velocity transducers are part of the standard it would be good to standize on the calibration.   | Provide a standard calibration for moving coil velocity transducers.   | Not Accepted. Specification is be agreed between purchaser and vendors |  | BP America, Inc           |
| 29 | Bob Eisenmann        | AffirmativeWith Comment | 6                                      | 6.17.3.3.8  | General   | In addition to the requirents here there should be a flatness requirement. Waveyness of the surface could have a great affect on the tansducer.                                    | Consider and implement a flatness requirement suitable for casing mounted transducers.   | Not Accepted. Not necessary  |  | BP America, Inc           |

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| 49 | Brian Howard    | NonVoter                | 6          | 6.17.3.3.8 | Technical | For some specific engines design and stud arrangement (e.g., aero-derivatives), the mounting holes are 1/4-18 NPT thread and not double-ended.   | The vendor shall supply with each velocity sensor a standard mounting option consisting of a double-ended, flanged, 1/4-28-UNF-2A threaded, AISI Standard Type 300 stainless steel mounting stud. 1/4-18 thread (flush mounted, not double-ended) is admissible on eroderivative engines (see Figure C.2 for an example of this arrangement) | Not Accepted. Too specific to one equipment type.         |  | Bently Nevada Corporation |
| 55 | Bill Robichaux  | AffirmativeWith Comment | 6          | 6.17.3.4   | Technical | Since Velometers are used at Low Frequency applications (2 Hz) like CWT (Cooling Water Tower Gearbox applications), there needs to be a statement to address the harsh environment and resistance to chemicals, moisture, etc... to ensure the probe is designed and selected for such applications. | Add a requirement " The probe shall be selected for the environmental conditions at which it is installed. This includes, but not limited to, process or chemical resistance, High Moisture environments and/or a changing temperature environment.  | Not Accepted. Too specific.                               |  | Shell                     |
| 35 | Bob Eisenmann   | AffirmativeWith Comment | 6          | 6.17.3.4.2 | Technical | The physical length requirement for the velocity sensor cable is not a requirement, since it only gives a nominal length. If this is deemed necessary, there should be a range for the length requirement.   | Provide a length range specification for the sensor cable. Otherwise, the requirement has no value and is not measureable.   | Not Accepted. Nominal directive                           |  | BP America, Inc           |
| 68 | R. Daryl Taylor | AffirmativeWith Comment | 6          | 6.17.3.4.4 | Editorial | 2 requirements in 1 clause   | separate the requirements  | Not Accepted. Shalls relate to same item.                 |  |                           |
| 56 | Bill Robichaux  | AffirmativeWith Comment | 6          | 6.17.4.1.3 | Technical | Add Type E Grounded to this list   | add Type E grounded thermocouples to this list as a well.  | Not Accepted. Too specific                                |  | Shell                     |
| 40 | Brian Howard    | NonVoter                | 6          | 6.17.4.1.6 | Technical | for hazardous area compliance (ATEX or IECEx) IP54 or higher is required: the overbraid may create issues in meeting such requirement  | Delete the requirementOR (as alternative).....NOTE Stainless steel overbraiding can be difficult to seal in some installations and could not be feasible where a minimum IP rating must be achieved (e.g. for hazardous area type of protection)   | Not Accepted. Overbraiding is a bulleted item.            |  | Bently Nevada Corporation |
| 28 | Bob Eisenmann   | AffirmativeWith Comment | 6          | 6.17.4.3.4 | General   | The text reads "The junction box(s) shall not be mounted on the machine casing but in a vibration-free environment." A vibration free environment seems excessive as a shall statement in this case  | Consider changing "vibration-free environment" to something similar to 6.18.2.2 C "Mounted separate from the machine in a location to minimize vibration. "  | Accepted. Paragraph revised.                              |  | BP America, Inc           |
| 57 | Bill Robichaux  | AffirmativeWith Comment | 6          | 6.17.4.3.4 | Technical | Junction Box shall be supported to prevent free motion.  | add Junction Box shall be supported to prevent free motion from wind, vibration andphysical impaact in the field,  | Not Accepted. Too specific                                |  | Shell                     |
| 27 | Bob Eisenmann   | AffirmativeWith Comment | 6          | 6.18.1.1.1 | General   | Previous editons have required 45 degree probes. This is still a desired arrangement that should be reinstated. Exceptions can be handled as such, excpeptions.  | Consider reinstating the 45 degree requirement for proximity probe oientation as in prior editions of API 670.   | Not Accepted. 6.18.1.1. a) specifies 90 degrees.          |  | BP America, Inc           |
| 39 | Brian Howard    | NonVoter                | 6          | 6.18.1.1.2 | Technical | According to API617 6.6.1.3.2 and 6.8.9.6 the probe area can be metallized or plated if the supplier has proven experience or test to reduce the electrical runout.  | b) Shall not be Metalized or plated unless allowed for in the machine mechancial standard  | Not Accepted. Other means shall be used to reduce runout. |  | Bently Nevada Corporation |
| 75 | Dietmar Sterns  | NonVoter                | 6.18.1.1.2 | 6.18.1.1.2 | Technical | The requirement should focus on a limit for total runout. A requirement for final surface finish is not needed, just like a manufacturing procedure for this surface is not needed.  | delete line c).If deleting seems too radical, add a note saying: "It is recommended that the surface should be manufactured with a surface finish of 1 µm (32 µin.) or less."  | Not Accepted. Surface finish can impact runout.           |  | RENK Aktiengesellschaft   |

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| 76 | Simon Bradshaw  | NonVoter                | 6.18.1.1     | 6.18.1.1.2      | Technical | Comment:Remove point b)  | Our standard, compliant with API610 runout requirements, is to use M819 coating  | Not Accepted. Application too narrow.   |  | Trillium Flow Services Ltd |
| 38 | Brian Howard    | NonVoter                | 6            | 6.18.1.1.4      | Technical | The radial probes gaps are set at -10.5 +/-1 volts DC. We find this voltage is more centered in the linearity range of the probe response and allows more clearance on units where the rotor's movement from 'at rest' is towards the probe tip. Probe gap settings are made at room temperature without benefit of oil circulation. As noted above, there is a tolerance +/-1 V on the gap setting. | The probe gap shall be set at -10.5 Vdc (+/-1.0 Vdc).  | Not Accepted. Application too specific  |  | Bently Nevada Corporation  |
| 77 | Dietmar Sterns  | NonVoter                | 6.18.1.1.4   | 6.18.1.1.4      | Technical | Bently Nevada Specifiation and Ordering Information for 8mm: Recommended Gap Setting for Radial Vibration: -9Vdc (approximately 1.27 mm (50 mils))   | The probe gap shall be set at -9 Vdc (+/-0.2 Vdc)  | Not Accepted. Application too specific  |  | RENK Aktiengesellschaft    |
| 37 | Brian Howard    | NonVoter                | 6            | 6.18.1.2.7      | Technical | We find 10.5 Volt to be more centered in the linearity range of the probe response and allows more clearance for movement towards the probe tip.   | -10.5 Vdc (±0.2 Vdc).  | Not Accepted. Application too specific  |  | Bently Nevada Corporation  |
| 78 | Dietmar Sterns  | NonVoter                | 6.18.1.2.7   | 6.18.1.2.7      | Technical | Bently Nevada Specifiation and Ordering Information for 8mm. Linear Range: 2 mm (80 mils). Linear range begins at approximately 0.25 mm (10 mils) from target and its from 0.25 to 2.3 mm (10 to 90 mils) (approximately -1 to -17 Vdc)  | The axial probe gap shall be set such way, that the transducer's output voltage is -9 Vdc (+/-0.2 Vdc), when the rotor is in the center of its thrust float.   | Noted. Out of scope for this edition  |  | RENK Aktiengesellschaft    |
| 26 | Bob Eisenmann   | AffirmativeWith Comment | 6            | 6.18.1.3.4      | General   | True veritcal needs a tolerance to be measurable.  | Add a tolerance.   | Not Accepted. Not a critical measurement.   |  | BP America, Inc            |
| 25 | Bob Eisenmann   | AffirmativeWith Comment | 6            | 6.18.1.4        | General   | In the past there have been phase angle transducers placed axially. This is bad practice and should be prohibited.   | Add a requirement that phae angle transducers are mounted radially and prohibit axial phase angle reference probes.  | Not Accepted. Good practices, but not standard  |  | BP America, Inc            |
| 51 | Brian Howard    | NonVoter                | 6            | 6.18.1.4.4      | Technical | tagging and reference are commonly on the probe instrument, not on the casing.   | Unless otherwise specifced, the phase reference probe and...   | Accepted in principle. Clarified that marking is outside of machine, not on the case.                                   |  | Bently Nevada Corporation  |
| 24 | Bob Eisenmann   | AffirmativeWith Comment | 6            | 6.18.1.6.1      | Editorial | The can looks like it is a permission and should be changed to a 'may.'  | Re-word  | Accepted. Changed can to may  |  | BP America, Inc            |
| 52 | Brian Howard    | NonVoter                | 6            | 6.18.1.7.1      | Technical | three additional independend speed probes are not possible on aeroderivative gas turbines.   | Add a special exception for aerodarivatives to allow two probes only, directly wired to a SIS ODS. Speed can be shared via data link, analog or buffered (isolated) output.  | Not Accepted. Application too specific, do not agree with data link/buffered output due to possibility of signal delay. |  | Bently Nevada Corporation  |
| 69 | R. Daryl Taylor | AffirmativeWith Comment | 6            | 6.18.1.8.3      | Editorial | revise for claritty  | change to " . . .shall not be mounted across a casing split line."   | Not Accepted. Do not want to mount across any split line.   |  |                            |
| 81 | Dietmar Sterns  | NonVoter                | 6.18.1.9.1.2 | 6.18.1.9.1.2 a) | Technical | other arrangements, not axially collinear, are working as well as this one, and are proven by experience too.  | change words to:"Bearings whose length-to-diameter ratio is greater than 0.5 shall be provided with two embedded temperature sensors located close to each other, at the three-quarter arc length (75 % of the pad length from the leading edge)." | Not Accepted. Standard layout acceptable; section does not include tilt pad bearings.                                   |  | RENK Aktiengesellschaft    |

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| 36 | Brian Howard    | NonVoter                | 6        | 6.18.1.9.2.2 | Technical | Thrust bearing pads may have an offset pivot. For these pad designs temperature sensors are therefore located further than 75% of the leading edge.   | Unless otherwise specified, thrust bearing temperatures sensors.....NOTE: Thrust pads with an offset pivot design may have the temperature sensors located further than 75% of the leading edge | Not Accepted. Technically correct, but too difficult standardize.   |  | Bently Nevada Corporation  |
| 58 | Bill Robichaux  | AffirmativeWith Comment | 6        | 6.18.1.9.2.5 | Technical | add a requirement that the penetration fitting shall be designed to prevent oil wicking or oil leakage into the Junmction Box. This has been an issue in the past and can cause the probe to malfunction when the junction box fills with liquid. | add a requirement that the penetration fitting shall be designed to prevent oil wicking or oil leakage into the Junmction Box.  | Not Accepted. Change does not add to standard.  |  | Shell                      |
| 70 | R. Daryl Taylor | AffirmativeWith Comment | 6        | 6.18.1.9.2.5 | Editorial | 3 requirements in 1 clause  | separate the requirements   | Not Accepted. Shalls relate to same item.   |  |                            |
| 59 | Bill Robichaux  | AffirmativeWith Comment | 6        | 6.18.2.1.12  | Technical | add a statement that all cables shall be properly identified, laabeled with heat shrink wrap tubing for complete traceability when exposed on the outside of the case in the junction box.  | add new statement " all cables shall be properly identified, laabeled with heat shrink wrap tubing for complete traceability when exposed on the outside of the case in the junction box."      | Not Accepted. Already specified in 6.17.1.3.4   |  | Shell                      |
| 60 | Bill Robichaux  | AffirmativeWith Comment | 6        | 6.18.2.2     | Technical | add a statement e) that prohibits the location in a place where it interferes with maintenance activities,.   | add new e) the location of the junction boxes shall be located in a position that does not interfere with maintenance activities or cause tripping hazards"                                     | Accepted in principle. Revised 6.181.2.2 c) to say the installation cannot interfere with maintenance activities                          |  | Shell                      |
| 86 | Simon Bradshaw  | NonVoter                | 6.18.2.4 | 6.18.2.4.1   | Technical | For sleeve bearings (not tilting pad) the RTD are spring loaded as permitted at para. 6.18.2.4.6.Note: clarification always necessary   | Make it that both types may be used.  | Not Accepted. Standard is embedded, option for bayonet  |  | Trillium Flow Services Ltd |
| 15 | Bob Eisenmann   | AffirmativeWith Comment | 6        | 6.5.3        | Technical | Who is the party responsible for this? What is the output that it can be measured?  | Define who is responsible and what data they need to furnish as proof, e.g. a calibration curve on the shaft or shaft material.   | Not Accepted. Annex G provides template for deciding scope. Only verification is done in the field, calibration is done by probe supplier |  | BP America, Inc            |
| 16 | Bob Eisenmann   | AffirmativeWith Comment | 6        | 6.5.5        | General   | Since there is more than one calibration method refered to by the referecne, the output from this requirment should include the method of calibration and the calibration outcome or curve.   | Require details of the method of calibration used and the calibration curve.  | Noted. To be considered for next edition  |  | BP America, Inc            |
| 19 | Bob Eisenmann   | AffirmativeWith Comment | 6        | 6.6.3        | General   | The intention is to provide a proximity probe system that conforms to the calibraton requirement in Table 1 and clause 6.17.1.5.1.1, not to ovide a system that calibrated to something not specified.  | Specify the requirement as conformity to 6.17.1.5.1.1 for the shaft material used or material of the probe target area.   | Accepted in principle. Paragraph revised to include reference to 6.17.1.5.1.1.  |  | BP America, Inc            |

|     |                      |                         |       |         |           |   |  |  |  |                           |
|-----|----------------------|-------------------------|-------|---------|-----------|---|--|--|--|---------------------------|
| 87  | Dietmar Sterns       | NonVoter                | 6.6.3 | 6.6.3   | Technical | in more than 95% of gear box orders, proximity probes do not get calibrated to the specified material of the shafts. Obviously, for all through hardened, case hardened and nitrided steels used in gear units, such additional calibration is not needed. The calibration to Type 4140 steel works fine. Experience available for steels Type 4140, 4320, 4340, E4340. | add a note to 6.6.3: "For through hardened, case hardened and nitrided steels as used in gear units (Types 4140, 4320, 4340, E4340), this calibration is not needed. The calibration to Type 4140 steel can be used for these applications."   | Accepted in principle. Note added to 6.6.2                         |  | RENK Aktiengesellschaft   |
| 45  | Brian Howard         | NonVoter                | 6     | 6.8.4   | Technical | Clean air purging is necessary when components are not design to withstand the moisture and pollutants present in the environment   | If specified, air purging shall be used when the conformal coating or pollution degree can't guarantee to withstand the environment pollutant to avoid moisture or corrosion problems, even when weatherproof or watertight housings are used (see 6.8.2 and 6.8.6). Purge air shall be clean and dry.   | Not Accepted. Do not understand comment.                           |  | Bently Nevada Corporation |
| 44  | Brian Howard         | NonVoter                | 6     | 6.8.6   | Technical | Not all proven and available systems have conformal coating for any aggressive environment  | If specified, PCBs shall have conformal coating to provide protection from moisture, fungus, and corrosion (if coating can't guarantee the adequate level of protection, See 6.8.4)  | Not Accepted. Do not understand comment.                           |  | Bently Nevada Corporation |
| 46  | Brian Howard         | NonVoter                | 6     | 6.9.1   | Technical | Most common power modules are universal analog from 120 to 240 Vac, 50/60 Hz without switch selector  | remove switch selectable OR... switch selectable or auto-switching, ....   | Accepted in principle. Updated paragraph                           |  | Bently Nevada Corporation |
| 72  | Brian Howard         | NonVoter                | 6     | 6.9.2   | General   | Depending on MPS vendor, some voltage levels are not available. Additional note to allow external power supplies  | If specified, the following power supply options may be used (with external power supply, if needed) a) 20 Vdc to 30 Vdc.....  | Accepted. Already covered.   |  | Bently Nevada Corporation |
| 114 | Mantosh BHATTACHARYA | NonVoter                | 7.1.4 | 7.1.4.6 | Technical | Add note after 7.1.4.6 on 2oo4 voting logic as normally practiced by end user / operating companies   | Note - Trip function on HH vibration can be considered based on 2oo4 configuration ( 2 probes out of the 2 bearings). This configuration may increase the availability of equipment due to the fact that single or two probe failures will not trip the machine. High radial vibration on the one end of the machine will also result in the other end (single shaft machine with two bearings). | Not Accepted. 2oo4 voting already available in most systems.       |  | Petrofac                  |
| 96  | Bob Eisenmann        | AffirmativeWith Comment | 7     | 7.1.4.7 | General   | Since there is more than one calibration method referred to by the reference, the output from this requirement should include the method of calibration and the calibration outcome or curve.   |  | Not Accepted. Comment does not match paragraph number.             |  | BP America, Inc           |
| 95  | Bob Eisenmann        | AffirmativeWith Comment | 7     | 7.1.5   | Technical | The section on axial position monitoring has lost an important requirement from the previous edition, 'shall have separate zeroing and gain   | Add a requirement to have shall have separate zeroing and gain adjustments for the two axial position channels.  | Accepted in principle. Added 7.1.1.5 c) to include zero adjustment |  | BP America, Inc           |
| 115 | Neetin Ghaisas       | AffirmativeWith Comment | 7.1.5 | 7.1.5   | Technical | Provide a choice for more than two axial probes.  | Add an if specified paragraph that allows users to select three axial probes instead of the conventional two axial displacement probes.  | Not Accepted. Application too narrow.                              |  | Fluor Corporation         |

|     |                      |                         |         |                |           |   |  |  |  |                           |
|-----|----------------------|-------------------------|---------|----------------|-----------|---|--|--|--|---------------------------|
| 113 | Brian Howard         | NonVoter                | 7       | 7.1.5.5        | Technical | Would be good to add an explanation of why this paragraph exists.   | NOTE: This paragraph addresses instance of axial probe failure due to contact between the rotor and probe tip. Under these circumstances the probe failure counts as a vote to trip but does not cause a trip.   | Not Accepted. 7.1.5.5 addresses failure of 1 or both axial probes which could be caused by rotor contacting the probe tip. |  | Bently Nevada Corporation |
| 98  | R. Daryl Taylor      | AffirmativeWith Comment | 7       | 7.1.7.3        | Editorial | 2 requirements in 1 clause  | separate the requirements  | Not Accepted. Shalls relate to same item.  |  |                           |
| 117 | Mantosh BHATTACHARYA | NonVoter                | 7.1.7.5 | 7.1.7.5        | Technical | ADD a note on spike energy measurement for anti-friction bearing.   | add - Spike energy is the high frequency levels of the vibration being produced by the "ringing" of the internal surfaces rubbing together. Spike energy detects frequencies beyond the linear range of most industrial transducers.   | Not Accepted. Spike energy not referenced in the standard  |  | Petrofac                  |
| 112 | Brian Howard         | NonVoter                | 7       | 7.1.7.5.b.iii  | Technical | A band pass starting at 5 Hz would attenuate a 1X signal of 300 rpm (5Hz) by 70.7%. Rolling element bearing (REB) cage frequencies are sub synchronous so that would be less than 5 Hz for a 300 rpm machine.                   | Equipment operating at shaft speeds from 750 rpm down to 300 rpm shall be monitored in a frequency range from 1.5 Hz to 1000 Hz.   | Accepted. Paragraph updated  |  | Bently Nevada Corporation |
| 89  | Bob Eisenmann        | AffirmativeWith Comment | 7       | 7.1.8          | General   | This section is titled temperature monitoring. The scope includes temperatures measurements in addition to bearing metal temperatures, but sp,e provisions in this section appear to relate to bearing temperatures.            | Can the document clarify to which temperatures this section pertains?  | Not Accepted. Section applies to bearing temperature and any other machinery temperatures.                                 |  | BP America, Inc           |
| 88  | Bob Eisenmann        | AffirmativeWith Comment | 7       | 7.2.1.13       | Editorial | High quality' is vague and unmeasurable.  | Reword   | Not Accepted. Importance of ODS cabling cannot be understated.   |  | BP America, Inc           |
| 97  | Bill Robichaux       | AffirmativeWith Comment | 7       | 7.2.1.14 (new) | Technical | add a statement to include acceleration trip functionality on the Over Speed Ttrip system. Based on internaql test results the Acceleration trip function provides a much quicker response time than the electronic OST system. | add new statement "if specified, an acceleration trip function or capabilities shall be provided." Also add a new NOTE "Note: An acceleration trip system is used to track the instaneous change in speed and perform a safe trip condition if the slope of the line becomes vertical or near vertical." | Not Accepted. O.4 recommends avoiding trip on acceleration   |  | Shell                     |
| 94  | Bob Eisenmann        | AffirmativeWith Comment | 7       | 7.2.1.7        | General   | Taken together with the note it is not clear as to whether this applies to integrally geared compressors. If does not, then what is the technical justification for other equipment?  | Clariy.Does this prohibit driving equipment rather than 'other mechanical equipment.'  | Accepted in principle. Removed note.   |  | BP America, Inc           |
| 91  | Brian Howard         | NonVoter                | 7       | 7.2.3.1        | Technical | Independend speed probes for the ODS are not possible on aeroderivative gas turbines.   | Add a special exception for aeroderivatives to allow two probes only, directly wired to a SIS ODS. Speed can be shared via data link, analog or buffered (isolated) output.  | Not Accepted. Application too specific, do not agree with data link/buffered output due to possibility of signal delay.    |  | Bently Nevada Corporation |
| 92  | Brian Howard         | NonVoter                | 7       | 7.2.4.1.1      | Technical | Aero Derivative GT overspeed system is based on 2 sensors with 1oo2 logic   | see comment for 6.18.1.7.1   | Not Accepted. 7.2.4.1.2 covers this scenario   |  | Bently Nevada Corporation |
| 93  | Brian Howard         | NonVoter                | 7       | 7.2.4.1.3      | Technical | Degradation to 1oo1 implies a reduction of integrity level and it might be not acceptable or acceptable only for a limited amount of time (with compensating measures) if SIL is required                                       | If specified, degradation to one-out-of-one voting in the case of a loop fault in a two channel system, is allowed (with or without a time limitation, depending upon SIL target if required)  | Not Accepted. 7.2.1.2 covers SIL target calculations.  |  | Bently Nevada Corporation |
| 99  | R. Daryl Taylor      | AffirmativeWith Comment | 7       | 7.2.4.4.3      | Editorial | 2 requirements in 1 clause  | separate the requirements  | Not Accepted. Shalls relate to same item.  |  |                           |

|     |                      |                            |          |             |           |   |  |  |   |                           |
|-----|----------------------|----------------------------|----------|-------------|-----------|---|--|--|---|---------------------------|
| 102 | Bob Eisenmann        | AffirmativeWith<br>Comment | 7        | 7.3.1.2     | General   | This clause requires surge detection on all axial flow compressors. Since the document also refers to gas turbines, it is not clear whether this applies to the axial flow compressor in a gas turbine. Clarify the intent.   | Clarify the intent as to whether this covers gas turbines, which have axial flow compressors.  | Accepted. Re-wrote paragraph to specify process compressors.                       |   | BP America, Inc           |
| 100 | R. Daryl Taylor      | AffirmativeWith<br>Comment | 7        | 7.3.3.1     | Editorial | 3 requirements in 1 clause  | separate the requirements  | Not Accepted. Second and third shall clarify the first.                            |   |                           |
| 90  | Brian Howard         | NonVoter                   | 7        | 7.3.3.3     | Technical | Sensors and transducers to antisurge control and surge detection are typically not redundant, i.e. the same transmitter is used by both systems.  | Unless otherwise specified, sensors used for compressor surge detection...                     | Not Accepted. Protection has to be separate from control.                          |   | Bently Nevada Corporation |
| 103 | Bob Eisenmann        | AffirmativeWith<br>Comment | 7        | 7.3.4.1.4   | Editorial | Multiple 'may' in Note.   | Reword   | Accepted. Reworded note.   |   | BP America, Inc           |
| 101 | R. Daryl Taylor      | AffirmativeWith<br>Comment | 7        | 7.3.4.1.5.2 | Editorial | multiple requirements in 1 clause   | separate the requirements  | Not Accepted. Second shall clarify the first.                                      |   |                           |
| 104 | Bob Eisenmann        | AffirmativeWith<br>Comment | 7        | 7.3.4.3.1   | Editorial | May in note   | Reword   | Accepted. Replaced by might  |   | BP America, Inc           |
| 105 | Bob Eisenmann        | AffirmativeWith<br>Comment | 7        | 7.3.4.3.2   | General   | This requirement has not specific requirement. Either Reword or delete.   | Reword to give a requirement or delete.  | Accepted in Principle. Reworded to provide paragraph numbers                       |   | BP America, Inc           |
| 118 | Mantosh BHATTACHARYA | NonVoter                   | 7.3.4.3. | 7.3.4.3.4   | Technical | 7.3.4.3.4The surge detector shall be capable of disabling the alerting and counting functions during compressor start-up or shutdown is not completely correct . During start up , the ASV ( Anti surge valve ) is kept fully open as start permissive , still due to some debris or improper cleaning of pipeline , surge was detected and tripped the machine at recycle run . Similarly , surge detector must be active during shutdown up to certain speed range as it provides the adequacy of hot/ cold recycle valve sizing done during dynamic simulation of compressor operation . | 7.3.4.3.4The surge protection and detector shall be ON during compressor start-up or shutdown. | Not Accepted. Standard describes system design features, not operating philosophy. | <a href="https://eballotprodstorage.blob.core.windows.net/eballotscontainer/Debris%20inside%20ASV.JPG">https://eballotprodstorage.blob.core.windows.net/eballotscontainer/Debris%20inside%20ASV.JPG</a> | Petrofac                  |
| 119 | Mantosh BHATTACHARYA | NonVoter                   | 7.3.4.3. | 7.3.4.3.4   | Technical | 7.3.4.3.4The surge detector shall be capable of disabling the alerting and counting functions during compressor start-up or shutdown is not completely correct . During start up , the ASV ( Anti surge valve ) is kept fully open as start permissive , still due to some debris or improper cleaning of pipeline , surge was detected and tripped the machine at recycle run . Similarly , surge detector must be active during shutdown up to certain speed range as it provides the adequacy of hot/ cold recycle valve sizing done during dynamic simulation of compressor operation . | 7.3.4.3.4The surge protection and detector shall be ON during compressor start-up or shutdown. | Not Accepted. Standard describes system design features, not operating philosophy. | <a href="https://eballotprodstorage.blob.core.windows.net/eballotscontainer/Debris%20inside%20ASV.JPG">https://eballotprodstorage.blob.core.windows.net/eballotscontainer/Debris%20inside%20ASV.JPG</a> | Petrofac                  |
| 106 | Bob Eisenmann        | AffirmativeWith<br>Comment | 7        | 7.3.4.4.3   | Editorial | May in note   | Reword.  | Accepted. Replaced by might  |   | BP America, Inc           |
|     |                      |                            | 7        | 7.3.4.4.1   | Add-hoc   | Consider deleting this section  |  | Accepted. Deleted this paragraph   |   |                           |
| 107 | Bob Eisenmann        | AffirmativeWith<br>Comment | 7        | 7.4.1.2     | Editorial | May in note   | Reword.  | Accepted. Replaced by might  |   | BP America, Inc           |

|     |                      |                         |                                |                |           |   |   |  |   |                           |
|-----|----------------------|-------------------------|--------------------------------|----------------|-----------|---|---|--|---|---------------------------|
| 108 | Bob Eisenmann        | AffirmativeWith Comment | 7                              | 7.4.2.2        | General   | Why is there a requirement on the purchaser?  | Consider what the requirement is who is responsible.Or, is this just datasheet information?   | Not Accepted. Purchaser to know what is safety critical in the facility and inform vendor. |   | BP America, Inc           |
| 111 | Brian Howard         | NonVoter                | 7                              | 7.4.4.2.4      | Technical | Depending on applicable maximum response time, some shutdown signals processed by MPS may be directly connected to final elements.  | Unless otherwise specified, the trip system and the ODS shall both receive final shutdown element feedback (Figure 22).   | Not Accepted. Final element must feedback to both systems.                                 |   | Bently Nevada Corporation |
| 109 | Bob Eisenmann        | AffirmativeWith Comment | 7                              | 7.4.4.3.2      | General   | The requirement is to give careful consideration. This is not measurable and will provide nothing.  | If there is an actual requirement provide it, or delete this as a requirement.  | Not Accepted. Addresses system design.   |   | BP America, Inc           |
| 110 | Bob Eisenmann        | AffirmativeWith Comment | 7                              | 7.4.5.2        | Editorial | This bulleted item does not use standards language for permission or a requirement, i.e. no shall or may.   | Clarify.  | Accepted in Principle. Revised paragraph   |   | BP America, Inc           |
| 120 | Bob Eisenmann        | AffirmativeWith Comment | 8                              | 8.4.1          | Editorial | Rather than worry about what is necessary, suggest delete the word necessary, since it is not needed.   | Delete word 'necessary.'  | Accepted. Removed 'necessary'  |   | BP America, Inc           |
| 121 | Bob Eisenmann        | AffirmativeWith Comment | 9                              | 9.2.3 e)       | General   | This requirement for special tools only requires that metric items be identified. It should be equally important to identify any tool   | Consider requiring identification of all special tools.   | Accepted in Principle. Revised to include all special tools                                |   | BP America, Inc           |
| 123 | Richard Dow          | AffirmativeWith Comment | 9.3                            | 9.3            | General   | I believe that API legal has asked us to make much of what is in contract data an appendix rather than part of the narrative?   | TF to review.   | Accepted in Principle. Task force will restructure paragraphs                              |   |                           |
| 122 | R. Daryl Taylor      | AffirmativeWith Comment | 9                              | 9.3.1 to 9.3.5 | Editorial | multiple requirements in 1 clause   | separate the requirements   | Accepted. Section revised.   |   |                           |
| 124 | Richard Dow          | AffirmativeWith Comment | all pages                      | all pages      | Editorial | Every page contains the statement "this document is not an API document ..."  | TF or API editors will have to remove from each page.   | Accepted. API editors will remove  |   |                           |
| 136 | Bob Eisenmann        | AffirmativeWith Comment | Annex I                        | Annex I        | General   | Since this standard is for machinery protection, this annex should make it clear that if using trip multiply, the a primary consideration is that no harm will be done. The main idea seems to be to preven alarms, not protect the equipement. | Consider the intent and add language to clarify that if trip multiply is used, that it should be designed to do no harm, still protecting the equipment.  | Not Accepted. Note in 7.1.4.8 addresses use of TM.   |   | BP America, Inc           |
| 126 | Bob Eisenmann        | AffirmativeWith Comment | Annex C                        | C.1.1          | General   | The requirement is to pay proper attention to... This is not measureable.   | Provide a measureable requirement.  | Accepted. Paragraph revised  |   | BP America, Inc           |
| 128 | Mantosh BHATTACHARYA | NonVoter                | Annex C Accelerometer Mounting | C.2.1          | Technical | Add - when high temperature sensors are to be mounted with adapter plates - particularly for screw compressor , special care to be taken.   | Add -when high temperature sensors are to be mounted with adapter plates - particularly for screw compressor , special care to be taken.  | Accepted in Principle. Added note on temperature.  | <a href="https://eballotprodstorage.blob.core.windows.net/eballotscontainer/adapter%20for%20sensor.JPG">https://eballotprodstorage.blob.core.windows.net/eballotscontainer/adapter%20for%20sensor.JPG</a> | Petrofac                  |
| 127 | Bob Eisenmann        | AffirmativeWith Comment | Annex C                        | C.2.2          | General   | Is there a requirement for flush mounting or not. The text is not clear.  | Clarify.  | Accepted. Revised paragraph  |   | BP America, Inc           |
| 125 | Bill Robichaux       | AffirmativeWith Comment | Annex C                        | C2.2.e         | Technical | Add a new statement to prevent the flush mounted probes from being installed on any access cover or gasketed surface and the gasket can dampen the vibration readings   | add new "e) the flush mounted probes shall not be installed on any access cover or gasketed mounted cover." Note: If the acceleromer or velometer is mounted on any access cover or gasketed surface this type of mounting arrangement can dampen the vibration readings taken. | Accepted in Principle. Added to standard   |   | Shell                     |

|     |                      |                         |                   |                 |           |   |  |  |   |                            |
|-----|----------------------|-------------------------|-------------------|-----------------|-----------|---|--|--|---|----------------------------|
| 132 | Brian Howard         | NonVoter                | Annex E           | E.1             | Technical | rms is too limiting. Should include rms and 0-pk since it is mentioned in E.2.1.  | The second path is integrated to 0-pk or rms velocity units (inches per second or millimeters per second).   | Accepted in principle. Updated to remove subunits.   |   | Bently Nevada Corporation  |
| 130 | Bob Eisenmann        | AffirmativeWith Comment | Annex E           | E.2.5           | General   | Shall be considered is not measurable.  | Provide a measureable requirement.   | Not Accepted. Wording is adequate.   |   | BP America, Inc            |
| 131 | Bob Eisenmann        | AffirmativeWith Comment | Annex E           | E.2.5           | Editorial | Care and understanding shall be applied to each application to ensure that adequate machine protection is provided. This is not measurable as a requirement.  | Delete as a requirement or provide a proper requirement.   | Accepted. Delete last sentence   |   | BP America, Inc            |
| 133 | Bob Eisenmann        | AffirmativeWith Comment | Annex F           | F.3             | Editorial | The rquirement is for the vendor to provide what has been selected from table F.2, not a requirement on the purchaser.  | Rewrite.   | Accepted. Revised  |   | BP America, Inc            |
| 80  | Dietmar Sterns       | NonVoter                | 6.18.1.9.1        | Figure 13       | Editorial | there are no more two notes below Figure 13. Accordingly, references to Note 1 and Note 2 need corrected  | delete reference to Note 2   | Accepted. Revised figures  |   | RENK Aktiengesellschaft    |
| 82  | Simon Bradshaw       | NonVoter                | 6.18.1.9.1.2      | Figure 13       | Technical | Electric motors' bearing RTD installation (as per here below sketch) is confirmed to be in the way that the RTD measurement point is always located 30 degrees (±10 degrees) from the vertical centerline in the normal direction of rotation as requested by API 670 even if the RTD connection is installed in horizontal position.Note: RENK bearing housings (used by most of the motors suppliers) allow horizontal installation only. Often, after PO, we are obliged to issue formal CR with consequent time impacts. In our experience motors supplier never made formal deviation, even if they well know, so if the paragraph change will help. | Modify diagram to allow for horizontal mounting of the RTD   | Not Accepted. Application to narrow.   | <a href="https://eballotprodstorage.blob.core.windows.net/eballotscontainer/api1.png">https://eballotprodstorage.blob.core.windows.net/eballotscontainer/api1.png</a> | Trillium Flow Services Ltd |
| 83  | Dietmar Sterns       | NonVoter                | 6.18.1.9.2        | Figure 15       | Editorial | second digit behind the dot in the dimension 0.76 mm is exaggerated.  | Round the dimension 0.76 mm to 0.8 mm, same as in Figures 13 and 14  | Accepted. Revised figure   |   | RENK Aktiengesellschaft    |
| 84  | Dietmar Sterns       | NonVoter                | 6.18.1.9.2        | Figure 15       | Technical | The bores for temperature sensor location are shown to be oriented perpendicular to the working face of the bearing, but that is just one of different possibilities. It is common to have bores that are oriented paralell to the working face of the bearing (maybe even more common than radial orientation).  | Add a note mentioning that the orientation of temperature sensor bores can differ from that shwon in Figure 13, for example orientation paralell to the working face of the bearing. | Not Accepted. Figure labelled as typical. Only sensor locations are specified.                                   |   | RENK Aktiengesellschaft    |
| 85  | Dietmar Sterns       | NonVoter                | 6.18.1.9.2        | Figure 15       | Technical | Distance between sensor tip and running face is shown to be 1.55 to 2.5 mm. This is not the same in Figures 13 and 14. And the min value should have one digit less behind the dot.   | change recommended distance to the same value as in Figures 13 and 14:"1.5 mm to 6.4 mm (0,06 in to 0,25 in)"  | Accepted. Updated significant figures. No changes to dimensions, radial bearings typically have thicker babbitt. |   | RENK Aktiengesellschaft    |
| 116 | Mantosh BHATTACHARYA | NonVoter                | 7.1.6.10          | Figure 16       | General   | The Rod drop indicator position shows only 6 o clock position whereas requirement is 12 o clock position and 6 o clock position.  | add one rod drop sensor to show 12 o clock position  | Not Accepted. All probes shown in Figure 12.   |   | Petrofac                   |
| 152 | Richard Dow          | AffirmativeWith Comment | figure 24, 25, 26 | Figure 24,25,26 | Editorial | are these figures misplaced? they seem to have nothing to do with the paragraph they are next to?   | TF to review.  | Accepted. Re-ordered figures   |   |                            |

|     |                |                         |            |            |           |   |   |   |  |                            |
|-----|----------------|-------------------------|------------|------------|-----------|---|---|---|--|----------------------------|
| 153 | Simon Bradshaw | NonVoter                | Section 7  | Figure H.3 | Technical | The protection systems needed to prevent damage to centrifugal pumps in a Loss Of Suction (LOS) event is not covered. Vibration measurement alone is not adequate to protect against these events. They require monitoring of the suction pressure and temperature and in certain cases also the balance line pressure and temperature. | This should be added as a subsection within section 7.  | Not Accepted. Not all hazop failure scenarios covered by 670.                 |  | Trillium Flow Services Ltd |
| 79  | Dietmar Sterns | NonVoter                | 6.18.1.9.1 | Figure13   | Technical | The bores for temperature sensor location are shown to be radially oriented, but that is just one of different possibilities. It is common to have bores that are axially oriented (maybe even more common than radial orientation).Same for Figure 14  | Add a note mentioning that the orientation of temperature sensor bores can differ from that shown in Figure 13, for example axial orientation.  | Not Accepted. Figure labeled as typical. Only sensor locations are specified. |  | RENK Aktiengesellschaft    |
| 135 | Bob Eisenmann  | AffirmativeWith Comment | Annex I    | I.3.3      | Editorial | This says a multiplier is required, ... There is no requirement here.   | Reword.   | Accepted. Reworded  |  | BP America, Inc            |
| 137 | Brian Howard   | NonVoter                | Annex I    | I.6.2      | Technical | The MPS can determine itself if the speed is within the TM speed range. Also, TM and any other State Based Alarming can be done within the MPS. Suggest adding the following.   | I.6.2 Absolute Speed Range SensingThis method requires the machine control system or the MPS to sense the rotational speed of the machine and activates an output any time the machine is operating at speeds between rpm1 and rpm2 (see Figure I.1). This is the preferred method.Any parameter within the MPS can also be used to determine the TM state to be implemented. | Accepted in principle. Updated I.1.1 to include internal MPS logic.           |  | Bently Nevada Corporation  |
| 138 | Bob Eisenmann  | AffirmativeWith Comment | Annex J    | J.3        | Editorial | The use of the word, 'must'.  | Reword  | Accepted. Replaced with shall   |  | BP America, Inc            |
| 139 | Bob Eisenmann  | AffirmativeWith Comment | Annex K    | K.5.2.2    | General   | This specific requirement advises to perform surge tests. The equipment OEM and the user should make this determination independent of the perceived need of assurance of the surge detection system. The annex should be clear that surge can have adverse consequences, whereas the focus appears to be on the detection system.      | Make clear in this annex the consequences that a surge can have.  | Not Accepted. Consequences of surge are assumed to be understood.             |  | BP America, Inc            |
| 141 | Bob Eisenmann  | AffirmativeWith Comment | Annex L    | L.4.2.4.2  | General   | This clause says that Table L.2 is taken from ISO 13849. Is this by permission?It is generally poor practice for one standard to duplicate material in another while referencing the other standard at the same time. Also, ISO standards should have a copywrite, and duplicating material may not be proper.                          | Review the use of ISO and other standards' material. It may be better to call out other standards than duplicating material in other standards.   | Not Accepted. API has approval to re-use the charts.                          |  | BP America, Inc            |
| 140 | Bob Eisenmann  | AffirmativeWith Comment | Annex L    | L.4.5.2.2  | Editorial | This clause has a shall in this informative annex.  | Change the word 'shall' in this informative Annex.  | Accepted. Replaced shall with are   |  | BP America, Inc            |
| 142 | Bob Eisenmann  | AffirmativeWith Comment | Annex L    | L.4.8.1    | Editorial | This clause has a shall in this informative annex.  | Change the word 'shall' in this informative Annex.  | Accepted. Reworded  |  | BP America, Inc            |
| 143 | Bob Eisenmann  | AffirmativeWith Comment | Annex M    | M.1.10     | Editorial | This appears to give permission to have ergonomic losses.   | Consider rewording.   | Accepted. Reworded  |  | BP America, Inc            |

|     |               |                            |         |           |           |   |  |   |  |                           |
|-----|---------------|----------------------------|---------|-----------|-----------|---|--|---|--|---------------------------|
| 145 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex M | M.2.4.6   | Editorial | This clause has a shall in this informative annex.  | Change the word 'shall' in this informative Annex.   | Accepted. Reworded  |  | BP America, Inc           |
| 144 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex M | M.2.4.7   | Editorial | Use of 'may' seems inappropriate for an informative annex in a standard.  | Re-word.   | Accepted. Reworded  |  | BP America, Inc           |
| 10  | Bob Eisenmann | AffirmativeWith<br>Comment | 3       | Missing   | General   | OK limits needs a definition. It is used for requiriements.   | Define 'OK limits'   | Accepted. Added definition  |  | BP America, Inc           |
| 146 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex N | N.4.1     | General   | The mode shape diagrams (bottom three panes) indicate the relative angle of twist across the model elements. The higher the slope of this line, the greater the change in twist. This is only true if the geometry (length) could be misleading, since this is a sketch and not a scaled drawing. Additionally, some of the diagrams indicate the relative angle and others diagrams may show the speed referenced angle instead of a geometrically consistent angle. Ther diagram in figure N.4 does not show a discontinuity across the gear element across a gear element; so, it may be a speed referenced diagram that does not reflect angles equally across the gear element. Care must be taken to interpret these diagrams properly. | Reconsider the wording.  | Not Accepted. These diagrams are to scaled diagram in length. The angles are scaled to reflect the relative twist of each mode with 1 be the max twist, angles are never speed referenced - unlike the polar momentum of inertia. |  | BP America, Inc           |
| 9   | Brian Howard  | NonVoter                   | 3       | n/a       | Editorial | Should include a definition of Digital Communication  | Digital communication Digital communication is used to send and receive processed data. This can include Status, measurements, configured properties such as alarm levels and full scale ranges etc. A common protocol is Modbus among many available from different OEMs. | Not Accepted. Commonly understood term.   |  | Bently Nevada Corporation |
| 149 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex O | O.2.4     | Editorial | Rather than just being part of the title for O2.4, the scope, i.e. what is included, should be part of the requirement, since this can be normative.  | Add text to clarify to what this applies.  | Accepted in principle. Added subitem  |  | BP America, Inc           |
|     |               |                            |         |           | Ad-hoc    | Free-running power turbine addition to Annex O? Check equations?  | Resolved; removed gas turbine section  | Accepted in Principle. Task force restructured paragraphs   |  |                           |
| 148 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex O | O.3       | Editorial | Rather than just being part of the title, the scope, i.e. what is included, should be part of the requirement, since this can be normative.   | Add text to clarify to what this applies.  | Accepted in principle. Section to be revised.   |  | BP America, Inc           |
| 150 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex P | P.4.2.1   | General   | This requires that static pressure transducers not be used. A better requiremetn would be a positive statemetn of what is required of a dynamic transducer.   | Give requirements for the transducer.  | Noted. Deferred to next edition   |  | BP America, Inc           |
| 151 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex P | P.4.4.1.3 | General   | This gives the frequency range to monitor. A better engineering requirement would have minimum frequency response requirements, pass band tolerance, e.g. in dB or percent.   | Add a more precise and measurable requirement inlcuding frequency response, e.g. 'Vibration monitored shall have a minimum range of 0.5 running speed frequency to 20X running speed frequency with an accuracy of +- x%.  | Not Accepted. This is a configured value.   |  | BP America, Inc           |

|     |               |                            |         |                       |           |   |  |  |  |                 |
|-----|---------------|----------------------------|---------|-----------------------|-----------|---|--|--|--|-----------------|
| 17  | Bob Eisenmann | AffirmativeWith<br>Comment | 6       | Table 1               | Technical | The operating range for cables is listed as 65 degrees C. Since these components can see similar temperatures as the probes they need to have similar temperature ranges. This fact was required in API 670 1st edition, i.e. having the same temperature range (clause 2.2 of API 670-1). The max temperature is not practical for many operating machines.  | Review the temperature limits for extension cables in Table 1 and update to practical and technically achievable values. | Accepted. Updated Table 1                              |  | BP America, Inc |
| 18  | Bob Eisenmann | AffirmativeWith<br>Comment | 6       | Table 1 and elsewhere | General   | Accelerometer calibration is given as mV/g, and the temperature range for calibration is unfit for high temperature applications. Is the standard limiting accelerometers to having integral electronic conditioning and excluding higher temperature applications?   | Somewhere specify whether the standard applies to other types of accelerometers.   | Not Accepted. Application too narrow.                  |  | BP America, Inc |
| 147 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex N | Table N.1             | Technical | Magnetostrictive torsional vibration probe and cable and interface module (all are together for the last two columns-- gives an average scale factor tolerance and a frequency response requirement. Since the transducer measures static and dynamic values, this should be clarified. A 3dB error in the frequency response is also a 3dB error in the measurement. How can this be distinguished from the 10% requirement on scale factor. | Clarify, is the average scale factor just for the d.c. portion or other?   | Accepted. Updated Table N.1                            |  | BP America, Inc |
| 129 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex E | Title                 | Editorial | This Annex is marked as normative. The title should not indicate that these are considerations but rather requirements.   | Consider changing the title to reflect that this annex is normative.   | Accepted. Changed title to "...detection requirements" |  | BP America, Inc |
| 134 | Bob Eisenmann | AffirmativeWith<br>Comment | Annex H | Various               | General   | Annex H is listed as informative, but it has 'shall' requirements.  | Change the word 'shall' in this informative Annex.   | Accepted. Updated text to remove shall.                |  | BP America, Inc |