**Inputs for revision of IS-11639 (Part-3) from HPPCL**

**Title: Structural Design of Penstock Criteria Part-3, Specials for Penstock.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Clause No.** | **Query/Suggestions** | **Decision of the Panel on 06 Sept 2023** |
| **1.** | **6.3.1 Design of gland bolt**The bolt is designed to exert enough pressure on the packing so that 1.25 to 1.5 times the internal hydrostatic pressure is mobilized between the sleeves and the packing. The value of Poisson’s ratio may be taken as 0.3 for flax and 0.5 for rubber. The inner sleeve is designed to resist the external pressure P2 exerted on it by packing due to bolt force, transferred through the gland. The following formulae may be used in the design of gland bolt:P2>=1.25 to 1.5 P ………………(x)P2= $\frac{P1μ}{(1-μ)}$Total bolt force = $\frac{MAY0}{fs}$ ………………………..(xi)Where,**P= internal pressure in the pipe in N/mm2** | The item highlighted in bold shall be modified as, **P = Internal pressure including water hammer.**The value of water hammer is not specified whether the same is to be considered for normal operation condition or emergency operating condition.The HPPCL, however, is of the opinion that the water hammer value to be considered for design pressure ‘P’ shall be for normal operating condition and checked for emergency water hammer condition. | Refer to the Committee for resolving the comment. |
| **2.** | **9. AIR VENTS AND AIR VALVES****9**.**6**  In order to avoid risk in the event of failure of air valves, it is desirable **to provide two or more redundant air valves**, so that minor malfunction of air valve will not cause serious damage. | There is an ambiguity in the clause regarding the provision of number of redundant valves. Whether the provision of the quantity of redundant air valves is linked with the requirement of absolute air demand or is simply an addition to the provisioned valves.**Clarification: -**On the basis of air demand the number of valves to be provisioned could be one or more (in case of abnormal size of valve). In case it is one in number, it is clear that the designer has to provide two or more redundant valves.On the basis of air demand, it is quite possible that the size of the valve becomes so large that it cannot be accommodated in the penstock as one piece and has to be equated into a number of valves. If the quantity so worked out is more than one, say four (4) in numbers, does it mean that the designer has to make a provision of an equal number of redundant valves (i.e. 4x2 or more) as per design or to keep a provision of only two additional valves, over and above the four valves.**Suggestion: -**HPPCL is of the opinion that a provision of two or more additional valves over and above the quantity worked out on the basis of air demand would be appropriate to serve the purpose. | Refer to the Committee for resolving the comment on provision of redundant valves on case basis. |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sl.****No.** | **Committee/ Organization/****Individual** | **Clause/****Sub clause****Paragraph****Figure/Table** | **Type of Comment****General/****Technical/****Editorial** | **Comments****(Justification For Change)** | **Proposed Change** | **The decision of panel on 06 Sept 2023** |
| **1.** | THDC India Limited | 3.1 General2nd Paragraph | Editorial | Typographical error in the first and second sentences. | 1. ‘110~’ be replaced by ‘flow’
2. ‘me’ be replaced by ‘mean’

Corrected sentence of para:Bends should be made with large-radius and small deflection between successive segments in order to minimize the hydraulic loss due to change in direction of **flow**. It is preferable to provide the radius of bend as 3 to 5 times **mean** diameter of the pipe and the deflection angle between each successive segments as 5 degrees to 19 degrees. | Panel members deliberated and agreed to incorporate the change. |
| **2.** | THDC India Limited | 3.4 Reducing Bends | Editorial | The formula for rx | 1. ‘q’ to be replaced by ‘Ø’

Corrected eqn rx = r1 – (x-1) R tan P sin**Ф** | The panel deliberated on the comment in panel meeting held on 29th November 2024 and Shri Sankhadip Choudhary, NHPC informed to check the ref in the literature and informed that it is to be **replaced with** $θ$ |
| **3.** | THDC India Limited | 5.1 General | Editorial | Typographical error in the first sentence. | 1. ‘bifurcation’ appearing at second instance be replaced by ‘trifurcation’

Corrected sentence of para:Depending upon the number of units a single penstock feeds, the penstock branching is defined as bifurcation when feeding two units, **trifurcation** when feeding three units and manifold when feeding a greater number of units by successive bifurcations. | Panel members deliberated and agreed to incorporate the change. |
| **4.** | THDC India Limited | 6.3.1 | Editorial | Typographical error in the second sentence |  ‘f’ be replaced by ‘ of ’Corrected sentence of para:For large diameter fabricated steel pipe, sleeve type joint is generally used. In this type, the longitudinal movement of the pipe is permitted by the provision **of** two closely fitting sleeves, the outer sleeve sliding over the inner sleeve. | Panel members deliberated and agreed to incorporate the change. |
| **5.** | THDC India Limited | 6.3.1.2 Design of inner sleeve | Editorial | Typographical error in the last sentence of penultimate paragraph | ‘u’ be replaced by ‘ σ ’Corrected sentence of para:The combined stress **σ** is given by: | Panel members deliberated and agreed to incorporate the change. |
| **6.** | THDC India Limited | 6.3.2 Bellows Type Expansion Joint | Editorial | Typographical error in the 4th sentence of first paragraph | ‘tm’ be replaced by ‘ type ’Corrected sentence of para:Such **type** of joints are not suitable for high heads above 15 m to 20 m because the thickness of diaphragm required to withstand the internal pressure would be too stiff to allow for any flexibility of expansion**.** | Panel members deliberated and agreed to incorporate the change. |
| **7.** | THDC India Limited | 6.4 Dresser Couplings | Editorial | Typographical error in the 2nd sentence of first paragraph | ‘r0’ be replaced by ‘ 10 ’Corrected sentence of para:They are flexible for movement of pipes and allow for about **10** mm movement and 3 degrees to 4 degrees deflection at each joint. | Panel members deliberated and agreed to incorporate the change. |
| **8.** | THDC India Limited | 7.2 | Editorial | Typographical error in the 3rd sentence of first paragraph | ‘arc’ be replaced by ‘ are ’Corrected sentence of para:Manholes **are** generally located at intervals of 120-150 metres. | Panel members deliberated and agreed to incorporate the change. |
| **9.** | THDC India Limited | 10  | Editorial | Typographical error in the Heading | ‘ACCESSOIUES’ be replaced by ‘ACCESSORIES’Corrected Heading of para:10 MISCELLANEOUS PENSTOCK **ACCESSORIES** | Panel members deliberated and agreed to incorporate the change. |
| **10.** | THDC India Limited | 10.3 Filling Connections | Editorial | Typographical error in the 1st sentence | ‘tilling’ be replaced by ‘ filling ’Corrected sentence of para:Intake nozzles are provided in the penstock at suitable locations for connection with **filling** lines, in order to allow slow filling of penstock during initial filling of the water conductor system. | Panel members deliberated and agreed to incorporate the change. |