|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **球冠形端封头内压校核(凹面受压)** | | | | 计算单位 |  | | | |
| 计算所依据的标准 | | | | | **NB/T 47003.1-2009** | | | |
| **计 算 条 件** | | | | | **简 图** | | | |
| 设计温度, t | | | ℃ | **$$001** | $01  $02  $03  $04  $05  $06  $07  $08  $09 | | | |
| 凹面 | 设计压力, Pd | | MPa | **$$002** |
| 静压力, Ps | | MPa | **$$003** |
| 筒 体 | 材料标准号 | | **$$004** | |
| 材料牌号/名称 | | **$$005** | |
| 内直径, Di | | mm | **$$006** |
| 名义厚度, δsn | | mm | **$$007** |
| 腐蚀裕量, Cs2 | | mm | **$$008** |
| 焊接接头系数, φs | | / | **$$009** |
| 筒体加强板名义厚度, δsrn | | | mm | **$$017** |
| 封 头 | 材料标准号 | | **$$010** | |
| 材料牌号/名称 | | **$$011** | |
| 内半径, Ri | | mm | **$$012** |
| 名义厚度, δcn | | mm | **$$013** |
| 腐蚀裕量, Cc2 | | mm | **$$014** |
| 焊接接头系数, φc | | / | **$$015** |
| 封头加强板名义厚度, δcrn | | | mm | **$$016** |
| 压力试验类型 | | | **气压试验** | |
| **材 料 特 性** | | | | | | | | |
| 封 头 | 材料密度, ρc | | kg/m³ | **$$018** | 筒 体 | 材料密度, ρs | kg/m³ | **$$019** |
| 设计应力, [σ]ct | | MPa | **$$020** | 设计应力, [σ]st | MPa | **$$021** |
| 试验应力, [σ]c | | MPa | **$$022** | 试验应力, [σ]s | MPa | **$$023** |
| 试验屈服点, RcreL | | MPa | **$$024** | 试验屈服点, RsreL | MPa | **$$025** |
| 负偏差, Cc1 | | mm | **$$028** | 负偏差, Cs1 | mm | **$$029** |
| 封头加强板 | 设计应力, [σ]crt | | MPa | **$$030** | 筒体加强板 | 设计应力, [σ]srt | MPa | **$$031** |
| 试验应力, [σ]cr | | MPa | **$$032** | 试验应力, [σ]sr | MPa | **$$033** |
| 试验屈服点, RcrreL | | MPa | **$$034** | 试验屈服点, RsrreL | MPa | **$$035** |
| 负偏差, Ccr1 | | mm | **$$038** | 负偏差, Csr1 | mm | **$$039** |
| **过 程 参 数 计 算** | | | | | | | | |
| 计算压力, Pc | | | MPa | Pc = Pd + Ps | | | | **$$040** |
| 封头 | 厚度附加量, Cc | | mm | Cc = Cc1 + Cc2 | | | | **$$041** |
| 有效厚度, δce | | mm | c | | | | **$$042** |
| 封头  加强板 | | 厚度附加量, Ccr | mm | Ccr = Ccr1 + 0 | | | | **$$043** |
| 有效厚度, δcre | mm |  | | | | **$$044** |
| 圆筒 | 厚度附加量, Cs | | mm | Cs = Cs1 + Cs2 | | | | **$$045** |
| 有效厚度, δse | | mm | s | | | | **$$046** |
| 圆筒  加强板 | | 厚度附加量, Csr | mm | Csr = Csr1 + 0 | | | | **$$047** |
| 有效厚度, δsre | mm |  | | | | **$$048** |
| 连接处球壳  切线与圆筒壁夹角, α | | | ° |  | | | | **$$049** |
| 材料许用压缩应力, | | | MPa | 查表 6-3 | | | | **$$050** |
| **封 头 内 压 校 核** | | | | | | | | |
| 计算厚度, δcc | | | mm |  | | | | **$$051** |
| 设计厚度, δcd | | | mm | δcd = δcc + Cc2 | | | | **$$052** |
| 厚度校核 | | | / | δcn ≥ δcd+ Cc1 | | | | **$$053** |
| **筒 体 内 压 校 核** | | | | | | | | |
| 计算厚度, δsc | | | mm |  | | | | **$$054** |
| 设计厚度, δsd | | | mm | δsd = δsc + Cs2 | | | | **$$055** |
| 厚度校核 | | | / | δsn  ≥ δsd+ Cs1 | | | | **$$056** |
| **封 头 与 筒 体 连 接 处 加 强 段 校 核** | | | | | | | | |
| 圆筒母线  单位长度环向内力, T2s | | | N/mm |  | | | | **$$057** |
| 封头单位长度经向内力, T1 | | | N/mm |  | | | | **$$058** |
| 封头单位长度环向内力, T2 | | | N/mm |  | | | | **$$059** |
| 圆筒  承受环向力有效宽度, Ws | | | mm |  | | | | **$$060** |
| 封头  承受环向力有效宽度, Wc | | | mm |  | | | | **$$061** |
| 总环向力, Q | | | N |  | | | | **$$062** |
| 所需总承压面积, A | | | mm2 |  | | | | **$$063** |
| 实际需增加的承压面积, Ar | | | mm2 | Ar = A - Ws(δsre+δse)- Wc(δcre+δce) | | | | **$$064** |
| 结论 | | | / | Ar <= 0 | | | | **$$065** |
| **压 力 试 验** | | | | | | | | |
| 封头试验压力, PcT | | | MPa | PcT = max{1.10×Pd×[σ]c/[σ]ct, 0.05} | | | | **$$066** |
| 封头加强板试验压力，PcrT | | | MPa | PcrT = max{1.10×Pd×[σ]cr/[σ]crt, 0.05} | | | | **$$067** |
| 筒体试验压力, PsT | | | MPa | PsT = max{1.10×Pd×[σ]s/[σ]st, 0.05} | | | | **$$068** |
| 筒体加强板试验压力，PsrT | | | MPa | PsrT = max{1.10×Pd×[σ]sr/[σ]srt, 0.05} | | | | **$$069** |
| 取用试验压力, PT | | | MPa | PT = min{ PcT, PcrT, PsT, PsrT } | | | | **$$070** |

注1：封头与其加强板同材质, 且焊接接头系数相同；筒体与其加强板同材质, 且焊接接头系数相同。

注2：封头、圆筒自身拼接及其加强板的拼接须采用对接焊接，封头与筒体连接处的焊接接头须为全熔透结构。

注3：封头加强板宽度需大于等于Wc，筒体加强板宽度需大于等于Ws。