High pressure gas safety law in Japan simple overview

KEK K. Tsuchiya Applicable scope: heat exchanger ... vessel : $P(Mpa) \times V(m^3) > 0.004$ ex. P= 0.2 Mpa $V > 0.02 \text{ m}^3 = 0.2 \text{ m} \text{ dia x } 0.64 \text{ m}$

What items will be controlled?

 Materials standard materials T and σ are specified
--> min. thickness of the vessel

For He vessel: SUS316L, SUS304L, Cu, Al, ...

- Process welding method (butt, backing,...) and efficiency
- Min. thickness calculation equation
- Test method

Example

A part of the table for SUS (allowable σ and T)

B

| 規格名称 | 種類の記号 | 製造 方法等 | 各 | | | | | | | | | |
|--|-------------|---|------------|-----------|------------|-----------|-----------|-----------|------------|-----------|------------|------------|
| | | | 温度 -269 | -196 | -100 | -80 | -60 | -45 | -30 | -10 | 0 | 40 |
| 記管用ステン レス鋼管 IIS G 3459 (1994) | SUS 304 TP | S (7)(8)(20) W(7)(8)(10(20) | | | 128 109 | | | | 128 109 | | 128 109 | |
| | SUS 304 HTP | S | - | - | - | - | - | - | 128 | 128 | 128 | 128 |
| | SUS 304 LTP | S W 00 | 109 93 | 109 93 | 109 93 | 109 93 | 109 93 | 109 93 | 109 93 | 109 93 | 109 93 | 109 93 |
| | SUS 309 TP | S (7)(8) W (7)(8)(10) | 1 1 | | 0.000 | | 1000 | | 128 109 | 1000 | | 10.00 |
| | SUS 309 STP | S (7)(8) W (7)(8)(10) | | | | | | | 128 109 | | | 128 109 |
| | SUS 310 TP | S (7)(8)(11) (7)(8)(12) | | | | | | | 128 128 | | | 128 128 |
| | | W ⁽⁷⁾⁽⁸⁾⁽¹⁰⁽¹¹⁾ (7)(8)(10(12) | | | 123273 | 1.000 | | 1000 | 109 109 | 1000 | | 1000 |
| | SUS 310 STP | S (7)(8)(11) (7)(8)(12) | | | | | | | 128 128 | | | |
| | | W ⁽⁷⁾⁽⁸⁾⁽¹⁰⁽¹¹⁾ (7)(8)(10(12) | | | 20.00 | | | 1000 | 109 109 | | 1000 | 1012.2 |
| | SUS 316 TP | S (7)(8)(20) W(7)(8)(10(20) | 1 1 | | | | | | 128 109 | | 1.1 | |
| | SUS 316 HTP | S | - | - | - | - | - | - | 128 | 128 | 128 | 128 |
| | SUS 316 LTP | S W (10) | 109 93 | 109 93 | 109 93 | 109 93 | 109 93 | | 109 93 | | 109 93 | 109 93 |
| | SUS 317 TP | S (7)(8) W (7)(8)(10) | | | | 200 | | | 128 109 | | | |

Fabrication must be proceed as follows:

 complete the design and it must be checked whether the fabrication method follows the specified method structure, welding method etc.

then, start the fabrication.

- ---- It is not so easy to change the design ----
- during the fabrication, the inspector will visit the factory and confirm whether the fabrication is going as designed at each fabrication step

material confirmation

welding method and strength confirmation

pressure test

---- It takes longer fabrication time ----

 we have to control the design and fabrication schedule carefully, then we will be able to make cryogenic equipments following the law.

When special material and/or fabrication method must be chosen for the fabrication, we have to have a special permission. In this case it takes another time for the process.

Conclusion

It seems that there is no specific safety aspects which may influence the design. But it will be very important to exchange the detailed design information each other if the system is used in Japan.