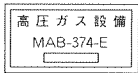
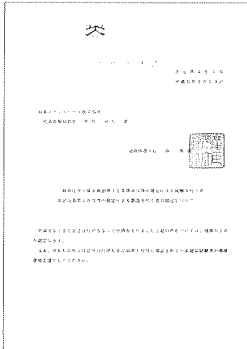


Worldwide Standards Capability

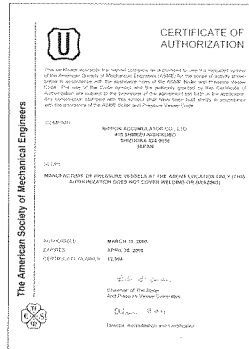
NACOL is authorized by the following authorities.

Japan



METI

U.S.A.



A.S.M.E.

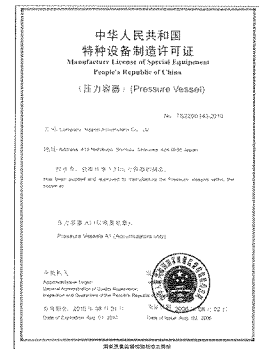
E U



CE 0035

TÜV Rheinland

China



TS2200143-2010

AQSIQ

NACOL can supply accumulators to almost any standard worldwide.

Regarding the other standards except below, please make contact with our sales department.

- | | |
|---|---|
| 1. High Pressure Gas Safety Law | (Ministry of Economy, Trade and Industry of Japan)
MAB-374-E (Accumulator), MAB-374-N (Valves) |
| 2. Electrical Industry Law | (Ministry of Economy, Trade and Industry of Japan)
Notification No. 501 to establish the technical standard of construction relating to Atomic energy equipment for generation of electricity. |
| 3. Labor Industrial Safety and Health Law | (Ministry of Health Labour and Welfare of Japan) |
| 4. Ship Safety Law (JG) | (Ministry of Land, Infrastructure and Transport of Japan) |
| 5. NK | (Nippon Kaiji Kyokai) |
| 6. ASME | (The American Society of Mechanical Engineers) No. 12,594 |
| 7. USCG | (United States Coast Guard) |
| 8. DOT | (United States Department of Transportation) |
| 9. ABS | (American Bureau of Shipping) |
| 10. PED | (Pressure Equipment Directive (97/23/EC) : CE 0035) |
| 11. GL | (Germanisch Lloyd) |
| 12. SAA | (Standard Association of Australia) |
| 13. MOT | (Ministry of Transport, New Zealand) |
| 14. LR | (Lloyd's Register of Shipping) |
| 15. BV | (Bureau Veritas) |
| 16. DNV | (Det Norske Veritas) |
| 17. CR | (China Corporation Register of Shipping (Taiwan)) |
| 18. KR | (Korean Register of Shipping) |
| 19. CCS | (China Classification Society (Ship Inspection Bureau)) |
| 20. Factories and Machinery Act | (Malaysian Standard) |
| 21. S.A.R.M.B.P.V. | (Administration of Quality Supervision, Inspection and Quarantine of the People's Republic China (AQSIQ)) |

Note that not all of our accumulator models fit these standards. If you require any of these standards, contact our Sales Department or distributors for standards and the accumulator models.

For other standards than the above, please let us know and we will be glad to assist you.

ISO 9001 & OHSAS 18001 Certificates obtained by NACOL

NACOL obtained ISO 9001 Certificate on 15th September, 1993 covering their main products Oil Hydraulic Accumulators.

The range of approval was expanded including Safety Valves and Stop Valves in its coverage in July, 1994.

NACOL obtained OHSAS 18001 Certificate on 9th October, 2006.

The approval coverage of each certificate as of **August, 2008** is as follows;



ISO 9001 Certificate



OHSAS 18001 Certificate

Several Advices for Customers.

- Neither this warning nor notes cover all the cases.
- Before handling the products, read the manual in details and consider your safety first all the time.

■ Notice to be paid when Accumulator selection is made.

1. At Accumulator sizing.

- Please add "Oil leak amount" and "Compressed liquid volume" upon "Required oil discharge volume (V_w)".
- Pressure loss amount which will occur between pump and Accumulator shall be deducted from the "Maximum working pressure (P_3)", and the pressure loss amount which may occur between Accumulator and actuator shall be added upon "Minimum working pressure (P_2)".
- Please make gas precharging (P_1) at the pressure to suit "Working temperature range", referring to the "Calculation Example" of page 95.
- When designing the energy saving hydraulic circuit with an accumulator, it is important to install a pressure switch and to make the ON-OFF power of pump.

2. At Accumulator model selection.

- Please select Accumulator which has enough specification such as allowable maximum working pressure and allowable oil flow speed to satisfy the concerned circuit specification.
- Please select Accumulator with suitable metallic and chemical material parts to meet the system fluid and working temperature.
- When you use fire resistant fluid (Water Glycol and Phosphate Ester Fluid), please select Accumulator which inside surface is not coated.
- Please select Accumulator which may satisfy laws, rules, and regulations of the country where the Accumulator may be installed.

■ Notice to be paid previous to working Accumulator.

- Before Accumulator operation, please read "Accumulator Handling and Maintenance Manual" attentively and understand the contents of the manual fully.
- Accumulator is a pressure vessel. For using the accumulator, follow the notice on the maintenance manual.

■ Notice to be paid when Accumulator is installed.



- Do not weld, cut or grind Accumulator shell.
- Confirm if the threads to be connected have a same specification.
- Vertical installation of Accumulator is most preferable, but can be installed at an angle between vertical and horizontal. Please do not place Accumulator upside-down.
- Care must be paid when Accumulator is installed horizontally as when installed this way, the "Maximum Allowable Oil Flow Speed" and "Allowable Compression Ratio" of the Accumulator decrease.
- Space axially above Accumulator is required in 30 cm approximately at the least for Accumulator maintenance purpose.



- Please adjust the axial lines of the accumulator and the hydraulic pipe to come on a same line, and then connect them.

- Please make it sure that Accumulator or hydraulic circuit is not put under undue force from machine working vibrations or earthquakes, by properly attaching Accumulator to a stable base using either a clamp (shown on page 87) or a band.

- When plural Accumulators are to be installed in a same hydraulic circuit, the Accumulators must be installed in such a way as pressure losses which may occur in the pipe lines per each Accumulator become same.



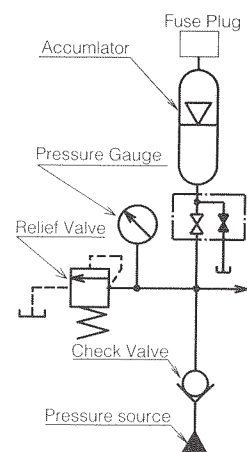
- Please ensure that Accumulator is not heated by its proximity to other adjacent equipment by setting up a barrier etc.



- Accumulator coating at the time of shipment from NACOL is for temporary purpose. So, please treat suitable rust-prevention treatment to suit the environment.



- Set relief valve between Accumulator and check valve as shown by the circuit sketch right side. Then, set the relief pressure lower than Accumulator maximum allowable working pressure.



Several Advices for Customers.

■ Notice to be paid at Gas Charging.

- Accumulator is not charged with nitrogen at the time of shipment from NACOL, in consideration of safety and also fatigue to bladder which may occur while transported. Please see "Accumulator Handling and Maintenance Manual" for further details.

Please do gas precharging with nitrogen gas just before Accumulator operation upto calculated pressure taking the temperature change into account. (Please refer Page 95 & 96 for the details.)



• The use of oxygen could cause explosion.

Please charge Accumulator only with dry nitrogen.

- Please use Gas Charging Tools after flashing them through with nitrogen gas.

If not flashed, the dust may be transferred from these tools to Accumulator gas valve and may cause gas leak from the Accumulator gas valve.

Please take off Gas Charging Tools from the Accumulator after gas charging as gas leak may be caused through these tools when left attached to the Accumulator.

Then please keep the Gas Charging Tools in a case protecting them from dust and dirt.

■ Notice to be paid when operating Accumulator.



- Use Accumulator at the pressure lower than the Accumulator maximum allowable working pressure.



- Hydraulic systems that incorporate gas-loaded accumulators shall automatically vent the accumulator liquid pressure or positively isolate the accumulator when the system is shut off. (from ISO 4413-1998 (Sec. 6.3.2))

- Please do not use Accumulator constantly with gas precharging pressure surpassing the minimum working pressure of the hydraulic system, as such condition may lead to premature bladder failure and oil port housing parts breakages.

Also, please do not leave gas precharged Accumulator unused or leave it precharged while Accumulator hydraulic circuit is stopped and left for more than one month.

- When one of the following phenomena can be seen, please stop the hydraulic system and check the precharged gas pressure after relieving the system pressure.

*The pressure gauge needle in the Accumulator circuit begins to flutter suddenly.

*Oil charge time becomes unusually short.

*Movement of actuator becomes unordinarily slow.

*Vibration or noise from pipe increases abnormally.

*Level of hydraulic liquid in reservoir ascends or descends abnormally.

■ Notice for maintenance job.

- Please adjust the gas charging pressure in consideration of the temperature change and check the leak and the appearance once every year.

■ Notice to be paid when doing disassembly, assembly, and discarding.



- When doing Accumulator disassembly, stop hydraulic system first, then relief the circuit pressure, and discharge Accumulator nitrogen gas completely, beforehand.



- When nitrogen gas is discharged from Accumulator, please do the job ventilating air well to avoid anoxia.

- When fluid reservoir is installed in a position higher than Accumulator, please do maintenance jobs first closing Accumulator fluid stop valve and drain valve. When the hydraulic service fluid remains in the accumulator body, please remove it before bladder insertion.

- When you insert new bladder, please check that there are no abnormalities (rust, crack, corrosion, wear, and deformation) in each part.

If there are any abnormalities, please replace the part to new one before the insertion of new bladder.

Also, please insert new bladder after applying hydraulic service fluid to the outside surface of bladder.



- Please do discarding of Accumulator after disassembling the parts and destroying them so that they may not be reassembled.

Foreign Exchange and Foreign Trade Law, Japan

Please contact our company when the order items and/or the quotation items are for the usages such as military weapon, nuclear power, and weapons of mass destruction. If the usages are for these purposes, the export shall be made after obtaining approval of the Japanese Ministry of Economy, Trade and Industry. Moreover, please do not deal with the enterprise and/or organization on the Foreign Users List provided by the Japanese Ministry of Economy, Trade and Industry.