CONTENTS

1.- INTRODUCTION

In order to achieve safe and effective operation in industrial installations, not only must operators have a broad understanding of engineering and operation of all machinery and equipment, but they must also perform continuous and proper maintenance of the equipment. Improper operation or maintenance of one single valve may affect the overall operation of the plant.

In order to help achieve trouble-free operation of the valves, we provide the information contained herein for optimal operation and conservation of the FIG. F14A ball valves.

1.1 APPLICATION:

½" to 6" ANSI 150
½" to 6" ANSI 300
½" to 4" ANSI 600

1.2 VALVES WITH ACTUATOR

This operation manual covers only manually operated valves. For valves actuated electrically, pneumatically or hydraulically, please consult the actuator operation manuals supplied by the corresponding manufacturers.

2.- HANDLING OF VALVES BEFORE ASSEMBLY

2.1 Before shipping, the inlet and outlet of each valve are capped in order to protect it from any mechanical damage while keeping out dust and foreign objects during shipping and handling.
Do not remove these caps until the valve is installed.

2.2 The valves must be kept in a well-ventilated dry area, free from dust.
Take special care not to damage the valve shafts during handling.
Avoid placing the valves directly on the floor. Under no circumstances should the valves be stored outdoors.
2.3 All valves are shipped with the sphere in the fully open position, in order to protect the sphere surface and soft valve seats. Always store them in this position.

3.- FITTING THE VALVE TO THE REST OF THE ASSEMBLY

3.1 First of all, check the plates, labels or any other type of identification of the valve and make sure you have ready the exact valves specified in your distribution plan.

3.2 Normally, areas where valves are installed are very dusty. For this reason be sure to keep the protective caps on the valves until they are ready to be fitted.

3.3 Once the dust caps are removed, carefully clean the inlets and outlets of both fittings and valves, so that all flange faces are free from any dirt or grime which would inhibit proper sealing.

3.4 Any scratches or other flaws where the valve face meets the gasket must be carefully repaired with sandpaper or a whetstone until the surface is smooth.

3.5 The pipe flanges must be correctly aligned with the valve flanges, as uneven tightening of the bolts may result in undesired stress elements both in the bolts and in the valve body.

3.6 Tighten the bolts gradually and evenly, each a bit at a time. Make sure that the bolts protrude beyond the nuts. After fitting the valve, check the bolts again and retighten any loose ones.

3.7 Finally, the inside of the fittings and valves must be cleaned, using for example water under pressure, in order to remove any foreign objects which might cause leakage in the future.
Actually, a very common phenomenon at new plants is leakage as a direct result of foreign objects in the valve seats which were not removed at the time of installation.

3.8 Make sure that any tension in the pipelines is not concentrated at the valves.

3.9 For valves fitted at the ends of the pipes, installation of a drainage device is generally recommended.

4.- OPERATION OF THE VALVE

4.1 A quarter-turn of the valve shaft fully opens or closes it. To close the valve, turn it clockwise, and turn it anti-clockwise to open it.
The turning force required is less when the valve is partially open than when it is fully open or closed.

4.2 At the first use of the valve, check for any leaks in the area of the press and the flange gaskets.

4.2.1 To solve any leakage problems through the flange gaskets, all of the flange bolts must be tightened gradually and evenly, each a bit at a time.
If retightening does not solve the problem, the gasket must be replaced with a new one.

4.2.2 In the unlikely event that there are leaks in the area of the press, proceed with changing the shaft gaskets as described in section 6.3.

4.3 The pressure-temperature ratings published by each manufacturer should normally be considered as a guideline for the maximum temperature and/or pressure that the valves can withstand.
Nevertheless we recommend consulting the manufacturer in order to be on the safe side, thus protecting your valves from deformation or damage to the sealing materials, when they are subject to the following conditions:

4.3.1 When the floating sphere valves are closed for long periods under extremely high temperature and/or pressure.

4.3.2 When the floating sphere valves are frequently operated for long periods under extremely high temperature and/or pressure.

4.3.3 When the valves are subjected to frequent temperature changes, especially if the valve seats are working very near the maximum values indicated in the pressure-temperature ratings. Similar care is necessary when sealing conditions during these temperature changes are in fluids with a low flow rate, low pressure and low viscosity.

4.4 When ball valves are operated frequently, supplying fluid at high speed, we recommend consulting with the manufacturer in order to reduce possible deformation of the valve seat, particularly when high pressures and temperatures are present.

4.5 Ball valves are not generally recommended for flow regulation, as constant circulation of fluid between the valve seat and the lower edge of the sphere could deform or damage the soft seats and cause them to drip even though they are fully closed.
The risk of deformation or damage to the valve seat is greater when the valve is used for extremely high flow rates and/or highly abrasive fluids, such as slurry or fluids with suspended particles which may get stuck along the way.
For this reason, ball valves must be used essentially for fully opening or closing to the flow of the fluid.

5.- PERIODICAL INSPECTION OF THE VALVE AND MAINTENANCE

5.1 To ensure safe and satisfactory operation of the valve, it is very important to perform a periodical inspection at fixed intervals, depending on the difficulty or risk associated with the service it performs.
Below are the main points which require this inspection.

5.1.1 Fluid leakage

a.- Coming from the shaft seal area.
b.- From the installation fittings
c.- From the union between the body and the terminal
d.- From the valve body surface

5.1.2 Generation of unusual noise

a.- Coming from the valve itself
b.- Coming from loose bolts
c.- Coming from vibrating pipes

5.1.3 Visual inspection

a.- Of the proper working position of the valve
b.- To ensure that the bolts are perfectly tightened
c.- Of wear on the shaft and sphere and corrosion of the body or nuts and bolts

5.2 If any of the above problems are detected, corrective action must be taken immediately:

ALWAYS DEPRESSURISE THE LINE AND THE VALVE BEFORE DISASSEMBLING PARTS WHICH ARE UNDER PRESSURE.

To depressurise the chamber made up of the body, the sphere and the seats, see section 6.1.2

5.2.1 Fluid leaks

-For leakage in the area of connection to the installation, see section 4.2.1
-If the leak arises in the area of connection between the body and the terminal or internally between the sphere and the seats, the seals must be renewed as explained in Section 6 of this manual.
-If the source of the leak is the surface of the valve body, it should be repaired by a specialist in valve repair.

6.- DISASSEMBLY AND ASSEMBLY OF THE VALVES

6.1 Before disassembling the valves, make sure the following preliminary procedures are followed:

6.1.1 Before decoupling the valves from the pipes, the valve flanges and the pipe coupling flanges must be marked to indicate their original position. This will help to avoid confusion or errors when refitting the valve.

6.1.2 Even after the fluid has been released from the pipe, there may be residual pressure in the body cavity (the space made up of the body interior, sphere and valve seats. Make sure that it is relieved by operating the valve once pressure has been released.

6.1.3 If the flange nuts and bolts have seized or locked, apply a lubricant for

loosening nuts and allow it to take effect in order to facilitate removal.

6.2 For disassembly of the external fixtures, proceed as follows:

Place the valve in a vertical position with the body (01) at the bottom and the sphere **in the closed position**, on a soft and clean surface.

First remove the handle (30 / 31), according to the size of the valve:

- N.D. <= 1"; Loosen and remove the nut (12) and then pull out the handle.
- N.D. = 1½"; Remove the bolt (35) and the washer (36), then pull out the handle.
- N.D. >= 2"; Loosen (do not remove) the screw on the side of the handle (34) and then pull the handle out.

6.3 For disassembly of the internal parts, proceed as follows:

Mark the body and the end connection, indicating their position relative to one another, in order to reassemble them in the same position later.

Loosen and remove the nuts (18). The number of nuts varies according to the size of the valve.

Remove the end connection (04) vertically, taking care not to damage the studs (17) which will remain affixed to the body.

Remove the metal gasket (24).

Remove the sphere (21) from inside the body, taking care not to bump or scratch it. **The sphere surface must be kept in optimal condition for proper operation of the valve.**

If the shaft seals are not removed, omit the following steps:

Unscrew and remove the control shaft nut (12). Pull out the two Belleville washers (11).

Remove the indicator (09) in the case of valves with a nominal diameter greater than 1". For those with a diameter of less than 1" the function of indicator (a quarter turn) is performed by the handle itself.

Remove the control shaft (05) by pushing it inside the valve body. If the shaft does not move manually, lightly tap the shaft en with a soft mallet. **Never use a hammer for this purpose**.

Remove the O-ring (40) from the shaft. This may be done manually by pressing on either side of the O-ring with the thumb and index finger and sliding them around its circumference in order to dislodge it, or by using a dull screwdriver, **taking extreme caution not to scratch the outside of the shaft or the O-ring seat.**

Remove the two friction rings (26) from the shaft.

Remove the neck bush (06) from its recess on the valve body. Then remove the sealing rings (25) from the same recess. Be careful not to damage it.

Remove the seats (22) from the body and the end connection. **This operation must be performed with utmost care so as not to scratch the Fire Safe lip, the walls and the bottom of the seat.**

6.4 Inspection of the valve components

6.4.1 The dirty interior of the valve must be cleaned with water, steam, acid or oil prior to inspection. Examine the internal non-visible area with an inspection tube or with a small mirror and a light. A liquid penetration test or X-ray inspection may also be performed if deemed necessary.

6.4.2 Worn or corroded areas must be inspected carefully, with a magnifying glass if necessary. Any wear or corrosion found on the limited area of the valve is extremely dangerous, as it could quickly result in very dangerous leaks. Special care must be taken in detecting cracking.

6.4.3 The wall thickness must be checked periodically to track any undesired variations which may result over time.

6.5 Reassembly of the valve

Once all of the components have been cleaned and any needed replacement parts such as bushings, seals, seats etc. have been obtained, the valves are reassembled as explained below.
After cleaning and before reassembly of the components, we recommend the application of a suitable anti-rust agent on the body interior, including the inside of the press.

Place the body in a vertical position resting on the flange, on a clean and soft surface.

Insert the seats (22) in their respective locations in the body and the end connection. Remember that the seats are not reversible, that is, that they are intended for placement in one direction only.

Place the O-ring (40) in the corresponding position on the shaft. Lightly grease the O-ring. Place the two friction rings (26) on the control shaft (05), sliding them until they make contact with the O-ring.

Place the control shaft in position through the body cavity. Press the end of the control shaft from inside until it is seated in position in the body. The friction rings (26) will be under the O-ring.

Place the sealing rings (25) in position, along the outside of the control shaft. The number of rings is determined by the size of the valve.

Place the neck bush (06) over the sealing rings (25).

Move the control shaft into the valve-closed position with the flat part of the threaded area of the shaft perpendicular to the direction of flow.

Place the indicator (09) on the shaft, setting the position according to the attached diagram

whilst maintaining pressure on the shaft from inside the valve to prevent it from sliding into the valve body cavity.

Place the two Belleville spring washers (11), contacting on the outer diameter, on top of the indicator.

Turn the nut (12) down onto the control shaft until it contacts the washers and continue tightening until some resistance is felt; see the recommended torque on the following table. **Fully open and close the valve in order to check for smooth operation.**

N.D.	Torque (Nm)
½", ¾" and 1"	10
1½"	15
2", 3" and 4"	25
6"	45

Place the sphere (21) in the body, lining up the notch on the sphere with the milled head of the shaft. This shaft position for inserting the sphere corresponds to the closed valve. **This operation must be performed with utmost care so as not to scratch or bump the sphere. It must be inserted gently and slowly. Never let it drop by its own weight as its outer surface could be damaged.**

Fully open and close the valve, checking the alignment of the sphere in the fully open position.

Place the metal gasket (24) in the body recess.

Fit the end connection (04), lining up the flange holes of the body and end connection. Make sure that the marks made before disassembly of the valve line up properly.

Lubricate the studs (17) before tightening the nuts. The nuts (18) must be tightened gradually following a star pattern. The number of nuts varies according to the size of the valve. **See the corresponding table for the final torque values for the nuts.**

Fit the handle (30 / 31) according to the size of the valve:

- ND <= 1"; Fit the handle and then thread and tighten the nut (12).
- ND = 1½"; Fit the handle followed by the washer (36), then thread and tighten the screw (35).
- ND >= 2"; Fit the handle and tighten the side screw (34).

7.- ACCEPTANCE TESTS

7.1 Check the service conditions of the valve by fully opening and closing it several times. The first movements will probably require more effort, which should decrease as the valve is opened and closed a few more times. Make sure that the indicator does indeed reflect the working position of the valve.

7.2 All of the valves after reassembly must undergo hydrostatic pressure tests and seating tests with compressed air to ensure correct operation of the valve and final acceptance.

8.- ANNEXES

Fig. 1 Exploded view

Fig. 2 Cutaway view ND ½" – 1"

Fig. 3 Cutaway view ND 1½" – 6"

Fig. 4 Torque value table

Fig. 5 Starting torque value table

Fig. 6 Test pressure table per ECC 5/4

Date	**Rev.**	**Created**	**Approved**	**Observations**

Figure 4

STUD AND NUT TORQUE VALUE TABLE (ITEM 17)
Values in Nm

	CARBON STEEL			STAINLESS STEEL		
METRIC	8.8 DIN 267	ASTM A193 B7	ASTM A193 B7M	A2-70 DIN 267/11 A4-70 DIN 267/11	A2-80 DIN 267/11 A4-80 DIN 267/11	ASTM A193 B8/B8M
M6	12	12	9	9	11	5
M8	29	29	22	21	26	12
M10	52	52	40	37	47	21
M12	87	87	67	62	79	36
M14	133	133	102	95	121	54
M18	256	256	197	183	233	105
M20	359	359	276	256	326	147

Note: To prevent seizing and to reduce the torque needed, all studs and nuts described in this table must be lubricated before tightening.

Figure 5

STARTING TORQUE VALUE
Values in Nm

ND	Port Ø	DIFFERENTIAL PRESSURE bar		
		20	50	100
½"	14	5	8	10
¾"	19	6	8	10
1"	25	8	10	15
1½"	38	20	25	30
2"	51	25	35	40
3"	76	60	90	-----
4"	102	120	175	-----
6"	152	120	175	-----

1 Nm = 0.1 da Nm = 0.1 m Kg = 0.723 ft lbs = 8.66 In lbs

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