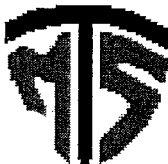
	<b>MANUAL OF THE QUALITY ASSURANCE SYSTEM</b>	SECCIÓN (SECTION)
		PAGINA 1 (PAGE)
		REVIEW “ 0 03/03/93 “ 1 22/02/95 “ 2 10/04/98
<b>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE – CHECK</b>		

REV.	REASON FOR CHANGES	REV. BY/DATE	APPRO. BY/DATE
0	EDITION OF THE MANUAL OF INSTRUCTIONS AND MAINTENANCE FOR VALVES	C.R. 3/3/93	EOA 3/3/97
1	NEW EDITION	C.R. 22/2/95	EOA. 22/2/95
2	MODIFICATION OF THE POINTS UNDERLINED WITH A VERTICAL LINE	J.P. 10/4/98	E.H. 11/4/98


<div>VALVULAS</div> <div></div>	<div>MANUAL OF THE QUALITY ASSURANCE SYSTEM</div>	<div>SECCIÓN (SECTION)</div>
		<div>PAGINA 2 (PAGE)</div>
<div>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE – CHECK</div>		<div>REVIEW</div> <div>“ 0 03/03/93</div> <div>“ 1 22/02/95</div> <div>“ 2 10/04/98</div>

## INTRODUCTION

This manual of instructions, is a private document of **MTS**, in which the instructions, systems and processes of our products' development are detailed. The Manual assures the fulfilment of the International standard **EN ISO 9001** requirements and has total approval of the Management and Accountables of the different departments.


Quality Assurance Department

Approval  
General Director

	<b>MANUAL OF THE QUALITY ASSURANCE SYSTEM</b>	SECCIÓN (SECTION)
		PAGINA 3 (PAGE)
		REVIEW “ 0 03/03/93 “ 1 22/02/95 “ 2 10/04/98
<b>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE – CHECK</b>		

## INDEX:

- 1.0. INTRODUCTION
- 2.0. EXPEDITION
- 3.0. INSPECTION AT RECEPTION
- 4.0. STORAGE
- 5.0. SELECTION
- 6.0. INSTALLATION
- 7.0. MAINTENANCE
- 8.0. OPERATIONS TO ASSEMBLE MTS VALVES
- 9.0. COMPONENTS OF GATE VALVES
- 10.0. COMPONENTS OF GLOBE VALVES
- 11.0. COMPONENTS OF CHECK VALVES
- 12.0. OPERATIONS TO ASSEMBLE MTS VALVES

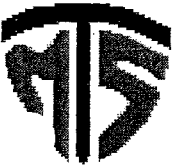
VALVULAS 	<b>MANUAL OF THE QUALITY ASSURANCE SYSTEM</b>	SECCIÓN (SECTION)  PAGINA 4 (PAGE)  REVIEW
<b>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE – CHECK</b>		“ 0 03/03/93 “ 1 22/02/95 “ 2 10/04/98

## 1.0. INTRODUCTION

The purpose of the present manual is to give information to our customers about basic questions; it embraces from the delivery of the valves by MTS until their installation. The manual deals with the following aspects of the MTS valves: Expedition, inspection, storage, selection, installation, disassembly and assembly. It is recommended the strict fulfilment of the detailed instructions along these pages. Modifications and variations related to the mentioned instructions must be notified in writing to MTS.

If any part of the described instructions is not fulfilled, MTS will have no responsibility and will cancel MTS valves guarantee.

Quality Assurance Department

VALVULAS 	<b>MANUAL OF THE QUALITY ASSURANCE SYSTEM</b>	SECCIÓN (SECTION)
<b>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE – CHECK</b>	PAGINA 5 (PAGE)	
	REVIEW “ 0 03/03/93 “ 1 22/02/95 “ 2 10/04/98	

## 2.0. EXPEDITION

Every valve supplied by MTS is protected by a heatproof paint of aluminium colour in the not mechanised external surfaces in order to prevent oxidation, except for austenitic bronze stainless steels, which are supplied without paint. These valves can wear other colours depending on the quality of the valve material (for more information it is recommended to look at the painting procedure followed by MTS).

The stems are externally protected with a protective material easy to remove. This way, transportation damages are lessened. This material can be paper or similar.

The Size of the valves will wear protectors that hinder the entry of dirt and other contaminating agents, so that the seat rings and seats are not scratched. Thus, the protectors used by MTS, not larger than 6”, consist of some plastic dust guards adjustable to the valve Size. Besides, they protect the finish of lateral flanges. For 8” and larger, wood bonnets are used with a diameter similar to the one of the lateral flange. They are tightened to the external flanges by wires.

In a similar way, valves with ends to be soldered have protectors tied to those ends.

Gate and Globe valves will be shipped completely closed to avoid possible bumps on the seats during their transportation and free of humidity to minimise as much as possible oxidation. MTS will decide whether it is convenient to apply an antioxidant product to the inside of the valve or not.

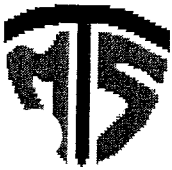
The check valves will have the valve flap fixed to the holes of the flanges by means of a wire or another device, in order to assure that the seats are not damaged.

The gate and globe valves will be supplied with definitive stem packing and with a number of rings as it is indicated in standard API600.

The valves supplied by MTS will go loose or well packed in boxes or pallets protected with plastic, according to MTS’s own criteria (unless it is otherwise specified in the customer’s order).

The identification of the valves and their main characteristics will be done by means of an identification plate that will be hold with a rivet to the body’s main flange, or it will be done according to the customer’s specifications.

The valves that are supplied in closed packages will wear a complete identification, not only inside, but also outside.

VALVULAS 	<b>MANUAL OF THE QUALITY ASSURANCE SYSTEM</b>	SECCIÓN (SECTION)  PAGINA 6 (PAGE)
<b>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES</b> <b>GATE - GLOBE - CHECK</b>		REVIEW  " 0 03/03/93 " 1 22/02/95 " 2 10/04/98

### 3.0. INSPECTION AT RECEPTION

MTS recommends for every valve a visual inspection at reception in order to detect any damage caused during transportation.

MTS valves tested by means of pressure need special care. Higher pressures than the ones indicated in our Quality Certificates will not be used, and if it were so, MTS would decline that responsibility.

Every fault found in our valves (visual, loss in the pressure test, etc) will be notified in writing to MTS in an immediate term to its reception. Furthermore, MTS recommends an accurate and as concrete as possible definition of the faults, so that the Quality Assurance Department can take proper measures and decisions in each case.

Please do not manipulate the valve without previous authorisation in writing by MTS.

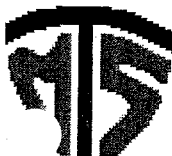
### 4.0. STORAGE

Every MTS valve must be stored in roofing or similar places, so that they are protected from the weather roughness and contaminating agents of the atmosphere.

They will be stored with protective bonnets that will not be removed until their definitive installation in the pipe-net.

Those valves inspected by means of pressure and packed in boxes must be protected internal and externally until their installation on the pipe.

MTS is not responsible for those faults produced due to wrong use, storage or defective transportation (when the transportation is the responsibility of the client) and the damage cannot be related to defective packing.

<div>VALVULAS</div> <div></div>	<div>MANUAL OF THE QUALITY ASSURANCE SYSTEM</div>	SECCIÓN (SECTION)
		PAGINA 7 (PAGE)
		REVIEW “ 0 03/03/93 “ 1 22/02/95 “ 2 10/04/98
<div>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE – CHECK</div>		

## 5.0. SELECTION

In order to improve efficiency each valve must be selected carefully, not only the type but also the material to be used. Before this, it is necessary to know which fluid runs through the valves, the pressure and the service temperature.

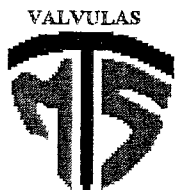
### 5.1. Material selection.

MTS has elaborated a corrosion table for materials indicating, what MTS recommends depending on the fluid.

### CORROSION TABLE FOR METALS AND ELASTOMERS

#### ADOPTED NOMENCLATURE:

- A Satisfactory resistance
- B Enough resistance
- C Light resistance
- D No resistance
- No information available



# MANUAL OF THE QUALITY ASSURANCE SYSTEM

SECCIÓN  
(SECTION)

PAGINA 8  
(PAGE)

REVIEW

" 0 03/03/93

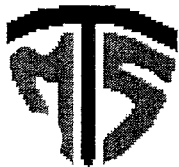
" 1 22/02/95

" 2 10/04/98

## QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE - CHECK

RESISTENCIA SATISFACTORIA A SATISFACTORY RESISTANCE BASTANTE RESISTENTE B ENOUGH RESISTANCE LEVEMENTE RESISTENTE C LIGHT RESISTANCE NO RESISTENTE D NO RESISTENCE NO TENEMOS INFORMACION - INFORMATION NOT AVAILABLE	MATERIALES METALICOS /METALIC MATERIALS																MATERIALES NO METALICOS NON METALICS MATERIALS	
	HIERRO FUNDIDO Y ACERO AL CARBONO CAST IRON AND CARBON STEEL	HIERRO FUNDIDO CAST IRON	Ct 18% Ni 8% ACERO INOXIDABLE Ct 18% Ni 8% STAINLESS STEEL	MONEL MONEL	NIQUEL NICKEL	BRONCE Cu 85% Zn 15% BRONZE Cu 85% Zn 15%	BRONCE ANTICORROSIVO ANTICORROSIVE BRONZE	BRONCE BRONZE	ALUMINIO ALUMINIUM	PLOMO LEAD	HASTELLOY -A HASTELLOY -A	HASTELLOY -B HASTELLOY -B	HASTELLOY -C HASTELLOY -C	HASTELLOY -D HASTELLOY -D	ALLOY - 20 ALLOY - 20	BUNA - N BUNA - N	NEOPRENO NEOPRENE	TEFLON TEFLON
ACIDO CITRICO CITRIC ACID	D	C	A	A	A	C	A	C	A	-	A	A	A	A	A	A	A	A
GAS DE COKE COKE GAS	A	A	A	C		C	C	C	A	-	-	-	-	-	A	B	C	A
SULFATO DE COBRE COPPER SULFATE	D	C	A	C	C	D	D	D	D	B	A	A	A	A	A	A	A	A
CREOSOTA CREOSOTE	A	A	A	A	A	C	A	C	A	-	A	A	A	A	-	-	-	-
AGUA DESTILADA PURA DISTILLED WATER PURE	D	D	A	D	A	D	D	A	A	D	A	A	A	A	A	A	A	A
AGUA DESTILADA ( RECUPERACION CONDENSADA) DISTILLED WATER ( RETOURN CONDESATE)	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	A
ETER ETHER	C	C	A	A	A	A	A	-	A	A	A	A	A	A	B	C	C	A
ETILEN GLICOL ETYLENE GLYCOL	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
FORMALDEHIDO FORMALDEHYDE	C	C	A	A	A	A	A	A	A	-	A	A	A	A	B	B	B	A
ACIDO FORMICO FORMIC ACID	D	C	A	B	C	D	C	C	D	-	A	A	A	A	B	D	-	A
FREON HUMEDO FREON GAS WET	C	A	C	A	A	A	A	A	A	-	-	-	-	-	-	-	-	A
GELATINA GELATINE	-	-	A	A	A	D	C	D	A	D	-	-	-	-	A	A	A	A
GLICEROL GLYCEROL	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
GLUCOSA GLUCOSE	A	A	A	A	A	A	A	A	A	-	-	-	-	-	A	A	A	A
HIDROGENO (GAS) HYDROGEN GAS	A	A	A	A	A	A	A	A	A	-	A	A	A	A	A	A	A	A
PEROXIDO HIDROGENO HYDROGEN PEROXIDE	D	D	A	A	A	C	C	D	A	B	C	C	A	C	B	D	D	A
AGUA INDUSTRIAL WATER INDUSTRIAL	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A
CLORURO FERRICO FERRIC CHLORIDE	D	D	D	C	D	D	D	D	C	D	D	D	C	D	D	A	A	A
SULFATO FERRICO FERRIC SULFATE	D	D	A	B	C	D	C	D	D	A	D	D	A	D	A	A	A	A
CLORURO MAGNESICO MAGNESIUM CHLORIDE	C	C	B	A	A	C	A	C	D	D	A	A	A	A	B	A	A	A
HIDROXIDO MAGNESICO MAGNESIUM HIDROXIDE	A	A	A	A	A	C	C	D	D	D	A	A	A	A	A	A	A	A
SULFATO MAGNESICO MAGNESIUM SULFATE	A	A	A	A	A	B	A	A	A	A	A	A	A	A	B	A	A	A
CLORURO DE MERCURIO MERCURY CHLORIDE	C	C	D	C	C	D	D	D	D	D	D	D	A	D	C	-	A	A
MERCURIO MERCURY	A	A	A	A	A	D	D	D	D	D	A	A	A	A	A	A	A	A
LECHE MILK	D	D	A	B	A	D	D	D	A	D	A	A	A	A	A	A	A	A
MEZCLA DE ACIDOS (SO <sub>2</sub> H <sub>2</sub> +NO <sub>2</sub> H; SO <sub>2</sub> H <sub>2</sub> >15% ACIDS COMPOSIT	A	C	D	D	D	D	D	D	D	D	-	-	-	-	-	-	-	-
MEZCLA DE ACIDOS (NO <sub>2</sub> H; SO <sub>2</sub> H <sub>2</sub> <15% ACIDS COMPOSIT	D	D	C	D	D	D	D	D	D	D	-	-	-	-	-	-	-	-
MEZCLA DE ACIDOS (SO <sub>2</sub> H <sub>2</sub> +NO <sub>2</sub> H; NO <sub>2</sub> H <15% ACIDS COMPOSIT	D	D	D	D	D	D	D	D	D	B	-	-	-	-	-	-	-	-



QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES  
GATE - GLOBE - CHECK

## RESISTENCIA SATISFACTORIA


- A SATISFACTORY RESISTANCE  
BASTANTE RESISTENTE
- B ENOUGH RESISTANCE  
LEVEMENTE RESISTENTE
- C LIGHT RESISTANCE  
NO RESISTENTE
- D NO RESISTANCE  
NO TENEMOS INFORMACION
- INFORMATION NOT AVAILABLE

## FLUIDS

## MATERIALES METALICOS /METALIC MATERIALS

MATERIALES NO  
METALICOS  
NON METALLICS  
MATERIALS

	HIERRO FUNDIDO Y ACERO AL CARBONO CAST IRON AND CARBON STEEL	HIERRO FUNDIDO CAST IRON	Cr 18% Ni 8% ACERO INOXIDABLE Cr 18% Ni 8% STAINLESS STEEL	MONEL MONEL	NIQUEL NICKEL	BRONCE Cu 85% Zn 15% BRONZE Cu 85% Zn 15%	BRONCE ANTICORROSIVO ANTICORROSIVE BRONZE	BRONCE BRONZE	ALUMINIO ALUMINIUM	PLOMO LEAD	HASTELLOY - A HASTELLOY - A	HASTELLOY - B HASTELLOY - B	HASTELLOY - C HASTELLOY - C	HASTELLOY - D HASTELLOY - D	ALLOY - 20 ALLOY - 20	BUNA - N BUNA - N	NEOPRENO NEOPRENE	TEFLON TEFLON
ACETONA ACETONE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	D	C	A
ACIDO ACETICO ACETIC ACID	C	C	C	B	C	C	A	C	C	B	A	A	A	A	A	D	D	A
ACIDOACETICO (PURO) ACETIC ACID(PURE)	D	D	B	B	C	D	A	D	A	B	A	A	A	A	A	D	D	A
ACIDO ACETICO (VAPORES) ACETIC ACID (VAPORS)	D	D	B	C	-	D	D	D	C	B	A	A	A	A	A	C	C	A
ANHIDRICO ACETICO ACETIC ANHYDRIDE	C	A	A	A	-	D	C	C	A	B	A	A	A	A	B	C	C	A
ACETATO DISOLVENTE DISOLVENT ACETATE	C	C	C	A	A	C	A	C	A	A	A	A	A	A	A	D	D	A
SULFATO ALUMINIO ALUMINUM SULFATE	C	C	A	A	-	C	C	D	C	A	A	A	A	A	A	A	A	A
CLORURO AMONIACO AMMONIUM CHLORIDE	C	A	C	A	C	D	D	A	D	C	A	A	A	A	C	B	A	A
NITRATO AMONIACO AMMONIUM NITRATE	A	C	A	C	C	D	D	D	A	-	D	D	-	D	A	A	A	A
FOSFATO AMONIACO (MONOBASICO) AMMONIUM PHOSPHATE (MONOBASIC)	D	C	A	C	-	D	A	D	D	A	A	A	A	A	C	A	A	A
FOSFATO AMONIACO (DIBASICO) AMMONIUM PHOSPHATE (DI-BASIC)	C	A	A	B	-	C	C	D	A	-	A	A	A	A	C	A	A	A
FOSFATO AMONIACO (TRIBASICO) AMMONIUM PHOSPHATE (TRI-BASIC)	A	A	A	A	A	C	C	C	A	-	A	A	A	A	C	A	A	A
SULFATO AMONIACO AMMONIUM SULFATE	A	A	C	A	A	C	A	C	C	A	C	A	C	A	B	A	A	A
AMONIACO (GAS) AMMONIA (AIR)	A	A	A	D	A	D	D	D	A	A	A	A	A	A	-	-	-	-
ASFALTO ASPHALTUM	A	A	A	A	A	A	A	A	A	-	-	-	-	-	A	B	C	A
BORAX BORAX	A	A	A	A	A	C	C	C	C	-	A	A	A	A	A	A	A	A
ACIDO BORICO BORIC ACID	D	C	A	A	A	C	A	C	A	A	A	A	A	A	A	A	A	A
BUTANO- BUTILENO BUTANE- BUTYLENE	A	A	A	C	C	A	A	A	A	A	-	-	-	-	A	D	D	A
BISULFITO CALCICO CALCIUM BISULFITE	D	D	A	D	D	D	C	D	C	B	-	-	-	-	A	A	A	A
CLORURO CALCICO CALCIUM CHLORIDE	A	A	C	A	A	A	A	C	D	-	A	A	A	A	D	A	A	A
BIOXIDO CARBONO (SECO) CARBON DIOXIDE (DRY)	A	A	A	A	A	A	A	A	A	A	-	-	-	-	-	-	-	-
BIOXIDO CARBONO (HUMEDO) CARBON DIOXIDE (WET)	C	C	A	C	A	B	C	C	A	C	-	-	-	-	-	-	-	-
HIPOCLORITO CALCICO CALCIUM HYPOCHLORITE	C	C	D	C	C	C	C	C	C	-	D	D	A	D	C	B	B	A
TETRACLORURO DE CARBONO CARBON TETRACHLORIDE	C	C	D	A	A	C	C	C	C	-	A	A	A	A	A	-	-	-
CLORO (SECO) CHLORINE (DRY)	A	A	C	A	A	C	C	-	C	A	-	-	-	-	A	C	C	A
CLORO (HUMEDO) CHLORINE (WET)	D	D	D	C	D	D	D	D	D	B	D	D	C	D	D	D	D	A
ACIDO CROMICO CHROMIC ACID	C	C	A	C	C	D	C	D	C	A	D	D	A	D	C	D	D	A
ACEITE OIL	A	A	A	A	A	D	D	A	A	-	-	-	-	-	A	A	A	A

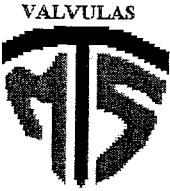
	<b>MANUAL OF THE QUALITY ASSURANCE SYSTEM</b>	<b>SECCIÓN</b> (SECTION)  <b>PAGINA</b> 10 (PAGE)  <b>REVIEW</b> " 0 03/03/93 " 1 22/02/95 " 2 10/04/98
<b>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES</b> <b>GATE - GLOBE – CHECK</b>		

RESISTENCIA SATISFACTORIA A SATISFACTORY RESISTANCE BASTANTE RESISTENTE B ENOUGH RESISTANCE LEVEMENTE RESISTENTE C LIGHT RESISTANCE NO RESISTENTE D NO RESISTANCE I NO TENEMOS INFORMACION INFORMATION NOT AVAILABLE		MATERIALES METALICOS /METALIC MATERIALS															MATERIALES NO METALICOS NON METALICS MATERIALS	
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FLUIDS		A	A	A	A	A	B	A	A	A	D	A	A	A	-	-	-	-
MELAZA MOLASSES		A	A	A	A	A	B	C	C	A	A	D	D	A	D	A	A	A
GAS NATURAL GAS NATURAL		D	D	C	A	C	D	D	C	D	-	D	D	A	D	D	A	A
CLORURO DE NIQUEL NICKEL CHLORIDE		-	-	A	C	C	C	C	C	D	A	D	D	A	D	B	A	A
SULFATO DE NIQUEL NICKEL SULFATE		D	-	C	D	D	D	D	D	C	D	D	D	C	D	A	C	B
ACIDO NITRICO NITRIC ACID		D	D	D	D	D	D	D	D	B	C	D	D	C	D	A	D	D
ACIDO NITRICO (PURO) NITRIC ACID (PURE)		A	A	A	A	A	A	A	-	A	-	A	A	A	A	A	A	B
ACEITES VEGETALES VEGETABLE OILS		C	C	A	A	-	C	A	C	A	B	A	A	A	A	B	A	C
ACIDO OLEICO OLEIC ACID		C	C	B	A	-	C	A	C	A	-	A	A	A	A	B	C	A
ACIDO OXALICO OXALIC ACID		A	D	A	A	-	A	A	A	A	-	-	-	-	-	A	-	-
OXIGENO GAS OXYGEN		C	C	A	A	-	A	A	D	A	B	-	-	-	-	B	B	B
ACIDO PALMITICO PALMITIC ACID		C	C	C	D	C	D	D	C	D	A	A	A	A	A	B	D	A
ACIDO FOSFORICO PHOSPHORIC ACID		D	C	A	C	-	D	C	C	D	A	A	A	A	A	B	B	A
ACIDO FOSFORICO (CONCENT < 45%) PHOSPHORIC ACID (CONCENT < 45%)		D	C	A	D	-	D	D	C	D	C	A	A	A	A	A	C	B
ACIDO FOSFORICO (CAL. CONCEN > 45%) PHOSPHORIC ACID (COLD CONCERN > 45%)		D	C	B	D	D	D	D	C	D	D	A	A	A	A	A	C	B
ACIDO FOSFORICO (ALTA CONCEN > 45%) PHOSPHORIC ACID (HIGH CONCEN > 45%)		D	C	D	A	C	C	A	C	A	A	A	D	D	A	B	B	A
ACIDO FOSFORICO (CONCENT < 10%) PHOSPHORIC ACID (CONCENT < 10%)		A	B	A	D	D	D	-	A	-	A	A	A	A	A	B	C	A
ACIDO PICRICO PICRIC ACID		C	A	A	D	D	D	-	A	A	A	A	A	A	A	-	-	-
ACIDO PICRICO (SOLUCION ACUOSA) PICRIC ACID (AQUEOUS SOLUTION)		A	A	C	A	A	A	A	A	C	-	A	A	A	A	C	A	A
CLORURO POTASICO POTASSIUM CHLORIDE		A	A	A	A	A	D	D	D	D	D	-	A	A	A	A	A	A
HIDROXIDO POTASICO POTASSIUM HYDROXIDE		A	A	C	A	A	A	A	A	A	A	-	-	-	-	B	A	A
SULFATO POTASICO POTASSIUM SULFATE		A	A	A	A	A	A	A	A	A	-	-	-	-	-	A	A	B
GAS PROPANO PROPANE GAS		C	A	C	A	C	A	A	A	D	A	A	A	A	A	A	A	A
AGUA DEL MAR SEA WATER		B	A	A	A	A	C	A	C	C	-	A	A	A	A	A	A	A
BICARBONATO SODICO SODIUM BICARBONATE		D	B	A	A	A	C	A	C	A	A	A	A	A	A	A	A	A
BISULFATE SODICO SODIUM BISULFATE		A	A	A	A	A	C	C	C	D	C	A	A	A	A	B	A	A
CARBONATE SODICO SODIUM CARBONATE		A	A	D	A	A	A	A	A	C	C	A	A	A	A	B	A	A
ACIDO SODICO SODIUM CHLORIDE		A	A	A	A	A	C	C	C	D	D	A	A	A	A	A	A	A
HIDROXIDO SODICO SODIUM HYDROXIDE		A	A	A	A	A	C	C	C	D	D	A	A	A	A	A	A	A

QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES  
GATE - GLOBE - CHECK

RESISTENCIA SATISFACTORIA A SATISFACTORY RESISTANCE BASTANTE RESISTENTE B ENOUGH RESISTANCE LEVEMENTE RESISTENTE C LIGHT RESISTANCE NO RESISTENTE D NO RESISTANCE NO TENEMOS INFORMACION INFORMATION NOT AVAILABLE		MATERIALES METALICOS /METALIC MATERIALS															MATERIALES NO METALICOS NON METALICS MATERIALS		
FLUIDS		HIERRO FUNDIDO Y ACERO AL CARBONO CAST IRON AND CARBON STEEL	HIERRO FUNDIDO CAST IRON	Ct 18% Ni 8% ACERO INOXIDABLE Ct 18% Ni 8% STAINLESS STEEL	MONEL MONEL	NIQUEL NICKEL	BRONCE Cu 85% Zn 15% BRONZE Cu 85% Zn 15%	BRONCE ANTICORROSIVO ANTICORROSIVE BRONZE	BRONCE BRONZE	ALUMINIO ALUMINIUM	PLOMO LEAD	HASTELLOY -A HASTELLOY -A	HASTELLOY -B HASTELLOY -B	HASTELLOY -C HASTELLOY -C	HASTELLOY -D HASTELLOY -D	ALLOY - 20 ALLOY - 20	BUNA - N BUNA - N	NEOPRENO NEOPRENE	TEFLON TEFLON
HIPOCLORITO SODICO SODIUM HYPOCHLORITE		B	C	C	C	C	D	D	D	D	D	D	D	A	D	C	C	D	A
METASFOSFATO SODICO SODIUM METAPHOSPHATE		B	-	A	A	-	B	A	C	A	-	A	A	A	A	A	A	A	A
NITRATO SODICO SODIUM NITRATE		A	A	A	A	A	C	C	A	A	-	D	D	A	D	B	C	A	A
PERBORATO SODICO SODIUM PERBORATE		C	B	A	A	A	C	C	C	B	-	D	D	A	D	B	C	A	A
FOSFATO SODICO (MONOBASICO) SODIUM PHOSPHATE (MONO-BASIC)		C	-	A	A	A	C	A	C	A	-	A	A	A	A	-	-	-	-
FOSFATO SODICO (DIBASICO) SODIUM PHOSPHATE (DI-BASIC)		C	A	A	A	A	A	A	A	A	-	A	A	A	A	B	A	A	A
FOSFATO SODICO (TRI-BASICO) SODIUM PHOSPHATE (TRI-BASIC)		A	A	A	A	A	D	D	C	D	-	A	A	A	A	B	B	B	A
SILICATO SODICO SODIUM SILICATE		A	A	A	A	A	D	D	C	D	B	A	A	A	A	B	A	A	A
SULFATO SODICO SODIUM SULFATE		A	A	A	A	A	A	A	-	A	A	A	A	A	A	A	A	A	A
SULFURO SODICO SODIUM SULFIDE		A	A	A	C	A	D	D	C	D	A	A	A	A	A	B	A	A	A
ACIDO ESTEARICO STEARIC ACID		B	B	A	A	A	C	C	C	A	-	A	A	A	A	B	A	C	A
CLORURO DE AZUFRE SULFUR CHLORIDE		A	C	C	C	C	D	D	D	B	-	A	A	A	A	A	D		A
DIOXIDO DE AZUFRE (SECO) SULFUR DIOXIDE (DRY)		A	A	A	A	-	A	A	C	A	A	D	D	A	D	-	-	-	-
TRIOXIDO DE AZUFRE (SECO) SULFUR TRIOXIDE (DRY)		A	C	A	A	-	A	A	A	A	A	D	D	A	D	-	-	-	-
ACIDO SULFURICO (CONCEN. 98%) SULFURIC ACID		A	C	B	D	D	D	D	C	C	D	D	A	D	A	A	A	A	A
ACIDO SULFURICO (CONDEN 75 + 98%) SULFURIC ACID		A	C	D	D	D	D	D	D	D	C	D	D	D	A	C	C	C	A
ACIDO SULFURICO (CONCEN 10 + 75%) SULFURIC ACID		D	C	D	B	C	D	C	D	C	A	D	D	D	A	C	C	B	A
ACIDO SULFUROSO SULFUROSO ACID		D	C	A	D	D	D	A	A	C	A	D	D	A	D	B	C	C	A
HIDROGENO SULFUROSO HYDROGEN SULFIDE		B	C	A	C	C	D	D	D	A	-	-	-	-	-	-	-	-	-
ALQUITRAN RESIN AND OIL		A	A	A	A	A	A	A	A	A	-	-	-	-	-	A	B	C	A
ACIDO TARTARICO TARTARIC ACID		D	C	A	A	A	C	A	C	A	C	A	A	A	A	B	C	A	A
TOLUOL O TOLUENO TOLUOL O TOLUENO		A	A	A	A	-	A	A	A	A	-	-	-	-	-	A	D	D	A
CLORURO DE ZINC ZINC CHLORIDE		C	C	D	A	-	D	D	D	D	A	D	C	C	D	B	B	A	A
SULFURO DE ZINC ZINC SULFIDE		C	A	A	A	-	C	C	C	C	A	C	C	A	C	-	-	-	-

## FLUIDS

	<b>MANUAL OF THE QUALITY ASSURANCE SYSTEM</b>	SECCIÓN (SECTION)
<b>QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE - CHECK</b>		PAGINA 12 (PAGE)
		REVIEW
		" 0 03/03/93
		" 1 22/02/95
		" 2 10/04/98

## 5.2. Type selection

- **Gate Valves.** The use is recommended only with the stem in a completely open position or totally closed.

In the completely open position, the fluid passes through without changing direction; therefore it has a great application and it is used in many installations.

If the stem were in an intermediate position, it would cause turbulence in the fluid and produce a rattling in the wedge of the seat.

Likewise, the seat surfaces that are exposed to the fluid would gradually and fast become eroded. Moreover, the fluid would increase its speed when passing through the wedge, therefore it would have less space to follow its way, which may cause a problem of hammering. The wedge types (solid, double seat gate, parallel and flexible wedge) have their particular application. The most recommended is the last one, because it closes better with the ring seat, thus not allowing any kind of leakage.

- **Globe Valves.** These valves are directed to regulate the fluid along the pipe. The seal surfaces of the valves are parallel to the direction of the fluid, distributed in the whole surface, so that much smaller erosion is produced, proportionally in the seats.

There is an interrelation between the size of the valve and the opening of the valve; a small valve half-opened has a longer life than a larger valve operating at an almost closed position (at equality of fluid).

- **Check Valves.** These valves allow the fluid to run in only one direction and it serves as a way to control the direction of the fluid along the pipe.

They have a valve flap that is up when the fluid exerts its pressure from the inner side of the disc and closed when the pressure is exerted at the back.

The complete opening of the valve flap depends on the type of check. MTS specialises in swing check type, which has the advantage of allowing a larger flow.



**QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES  
GATE - GLOBE - CHECK**

## **6.0. INSTALLATION**

MTS recommends cleaning the inside part of the valve with water or compressed air to prevent the dirt that may be accumulated due to the storage time.

The elevation of the valve is connected to the pipe via nylon or hemp straps. If they were metal-made, they would have to be protected with plastic or something similar, so that the surfaces are not damaged.

The strap will go through the inside of the bridge and never through the handwheel or drive.

Depending on the type and weight of the valve to be elevated it is important to utilise a machine adequate to the weight of the valve. MTS has a weight list for every valve. SEE WEIGHT TABLE

The pipe must be well supported to avoid transmitting too much weight to the valve body, and the valve flanges must be perfectly aligned with the pipes to allow an adequate tightening.

The valves have to be installed in their right position (globe and check valves have an arrow that indicate the direction in which the fluid flows).

The best valve installation is produced when the stem is placed in vertical or horizontal position.

It is recommended to leave enough place to access the valve and also for a better maintenance.

The gripping device of the valve flap should be removed from the check valve before the pipe is installed.

Suitable tools must be used at the time of connecting the valve and the pipe. When the valves are connected with flanges, the bolts will be crossed screwed in.

Not only the valve, but also the pipe should be butt welded with the taper component and, after well aligned, welded around. Protection rings can be used (of copper, ceramics) to avoid the entry of scale to the inside, because it can damage the seat surface of the valves.

In order to avoid the problem of hammering and water condensation, due to a sudden fluid stop, a suitable air chamber or another up-water holder must be installed not very far from the valve.

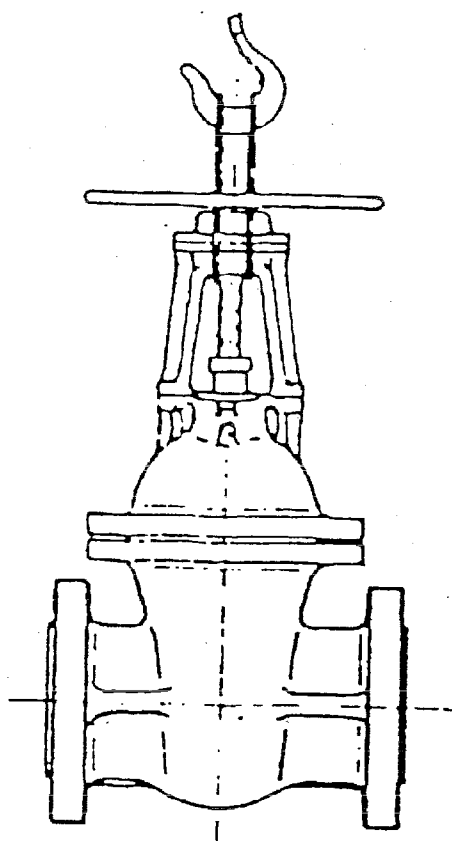
**QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES  
GATE - GLOBE - CHECK**

In case the hydrostatic test of the pipe is carried out with the valve assembled, the testing pressure used when the valve was inspected in the factory cannot be exceeded. Test pressures are included in the Quality Certificate. The hydrostatic test can be carried out with the valve completely open, in such a way that the stem closes at the back against the bonnet seat.

If one wishes to test the stem packing, the valve must not be opened totally.

Once the valve has been heated with the fluid up to the service temperature, it may be necessary to adjust the stem packing to eliminate leakage. This operation is carried out tightening alternately the two gland flange nuts, thus avoiding damages in the stem.

The drains and bypasses must be effected in those points marked in our charts. No perforation for drains, bay passes, etc. can be done over the bonnet body without first asking for permission to MTS.





**QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES  
GATE - GLOBE – CHECK**

## 7.0. MAINTENANCE

MTS recommends a periodic inspection to avoid possible leakage even if the leakage is small.

It is important to take into account that the valves can be inspected without disassembling the pipe body. The bonnet can be disassembled to observe the condition of the seat surfaces. Besides, the large quantity of valves allows their inspection without a serious service interruption.

Revise from time to time the valve socket to maintain always a perfect alignment.

When there is a leakage at the body-bonnet connection, proceed to make it tight. If the leakage does not stop, replace the gaskets for new ones.

If there is a leakage produced due to the stem packing, the stuffing-box bonnets and nuts will be tightened and this should be enough. If the leakage still continues, that stem packing will be replaced; this operation can be performed without interrupting the fluid circulation. In order to make this, the stem will be totally opened until it is sealed at the back and the stem packing is changed. The time needed for the stem packing is smaller, when more operations are performed on the valve. Thus when it is completely open, there is less wear, than if it is being opened and closed constantly.

If the leakage is produced for another reason and the valve has to be disassembled, MTS recommends complying with the disassembling standards that stay on this Manual

## 8.0. OPERATIONS TO DISASSEMBLE MTS VALVES

### 8.1. Gate and globe valves.(screwed bonnet)

Operations to disassemble the body bonnet.

- Do it with the valve in open position.
- Ease the stuffing box pressure off.
- Release the body-bonnet nuts by loosening them crossed.
- Remove the body-bonnet studs.
- Proceed to lift the upper assembly (bonnet-stem) towards the stem.

The body seats and the wedge can be revised following these steps, with no need to disassemble any other pieces.

Do not forget to check the reference when revising the wedge, in order to mount it back in the same way.



8.2. To disassemble the stem, follow the next indications:

- After performing operations mentioned at the previous point:

· Unscrew the stem from its stem nut. For gate valves turn the stem nut with the correspondent open-end wrench, or use its own handwheel, while the stem is firmly hold, so that it does not rotate over and over. In this operation, take special care not to damage the stem important areas, such as the 45° seal and its polished diameter.

For globe valves the operation will be carried out by holding the bonnet to avoid rotation and using a pressure wrench fixed to the stem to make it turn and to unscrew it from its stem nut. As in the previous point, this operation must be performed carefully. Also, do not forget to observe that the stem and stem packing are not wearing off, just in case it is needed to replace one of the two.

8.3. Check valves (screwed bonnet).

To disassemble the body bonnet follow the next operations:

- Unscrew the body-bonnet nuts crossed.
- Remove the body-bonnet studs.

This way, every internal valve part is accessible.

8.4. To disassemble the valve flap follow the next operations:

-After performance of the operations mentioned at the previous points continue with:

Unscrew the body dust guards.

- Remove the axis; the valve flap is freed.



**9.0. COMPONENTS OF THE GATE VALVES**

- 1.- BODY
- 2.- BONNET
- 3.- WEDGE
- 4.- SEAT RING
- 5.- STEM
- 6.- BACK SEAT BUSHING
- 7.- STEM PACKING
- 8.- GLAND BUSHING
- 9.- GLAND FLANGE
- 10.- EYE BOLT
- 11.- GLAND EYE NUT
- 12.- SPLIT NUT FOR THE EYE BOLT
- 13.- SPLIT BOLT OF THE EYE BOLT
- 14.- STEM NUT
- 15.- YOKE NUT
- 16.- HANDWHEEL
- 17.- HANDWHEEL NUT
- 18.- HOLLOW SETSCREW
- 19.- GREASE CUP
- 20.- BODY-BONNET GASKET
- 21.- BODY-BONNET STUD
- 22.- BODY-BONNET NUT
- 23.- IDENTIFICATION PLATE



# MANUAL OF THE QUALITY ASSURANCE SYSTEM

SECCIÓN  
(SECTION)

PAGINA 18  
(PAGE)

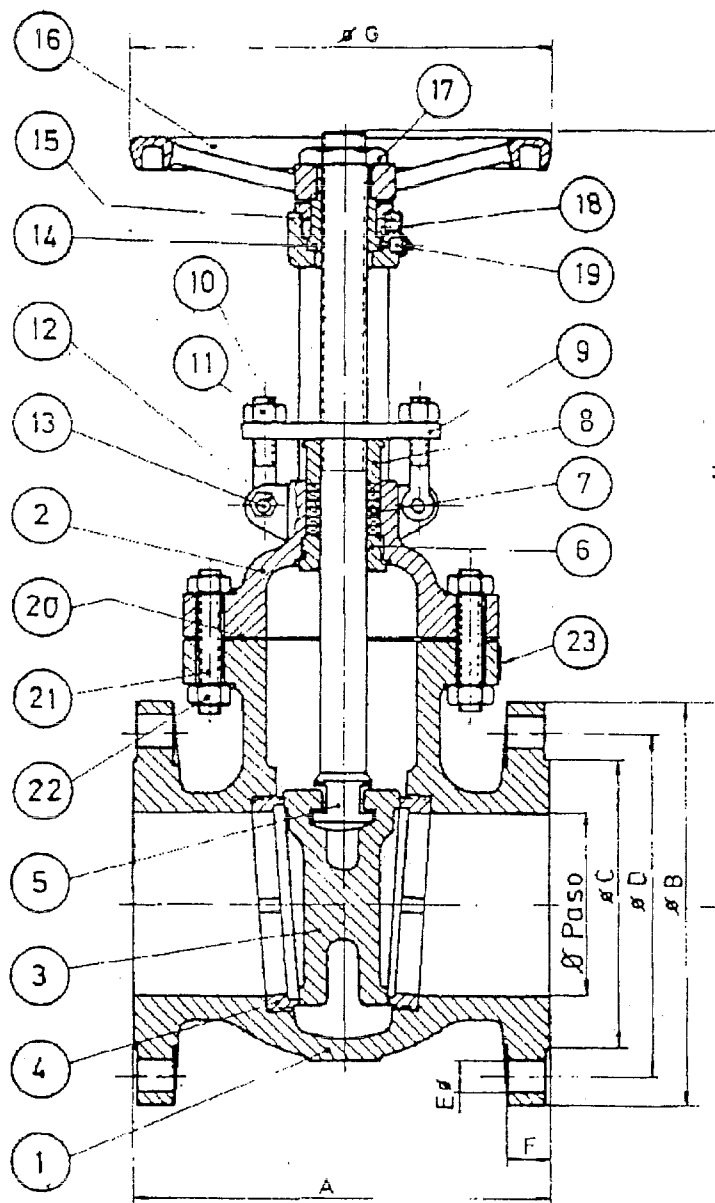
REVIEW

" 0 03/03/93

" 1 22/02/95

" 2 10/04/98

## QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE - CHECK



SIZE	A	B	C	D	E N° X Ø	F	G	H	
								OPEN	CLOSED
2"	177.8	152.4	92	120.6	4 DE 19	16	200	365	290
2 ½"	190.5	177.8	104.8	139.7	4 DE 19	17.5	225	430	345
3"	203.2	190.5	127	152.4	4 DE 19	19	225	460	375
3 ½"	216	215.9	139.7	177.8	8 DE 19	20.5	225	480	400
4"	228.6	228.6	157.2	190.5	8 DE 19	24	275	560	445
5"	254	254	185.7	215.9	8 DE 22	24	325	745	580
6"	266.7	279.4	215.9	261.3	8 DE 22	25.5	325	745	580
8"	292	342.9	270	298.4	8 DE 22	28.5	375	980	770
10"	330.2	406.4	323.8	361.9	12 DE 25	30.5	450	1170	900
12"	355.5	482.6	381	431.8	12 DE 25	31.5	500	1420	1100

**10.0 COMPONENTS OF THE GLOBE VALVES**

- 1.- BODY
- 2.- BONNET
- 3.- DISC
- 4.- SEAT RING
- 5.- STEM
- 6.- DISC BOLT
- 7.- SPLIT WASHER
- 8.- FRICTION WASHER
- 9.- DISC HOLLOW SETSCREW
- 10.- BACK SEAT BUSHING
- 11.- STEM PACKING
- 12.- GLAND BUSHING
- 13.- GLAND FLANGE
- 14.- EYE BOLT
- 15.- GLAND EYE NUT
- 16.- EYE BOLT SPLIT NUT
- 17.- SPLIT BOLT OF THE EYE BOLT
- 18.- STEM NUT
- 19.- KNOCKOUT PIN
- 20.- HANDWHEEL
- 21.- HANDWHEEL WASHER
- 22.- HANDWHEELNUT
- 23.- BODY-BONNET GASKET
- 24.- BODY-BONNET STUD
- 25.- BODY-BONNET NUT
- 26.- IDENTIFICATION PLATE



# MANUAL OF THE QUALITY ASSURANCE SYSTEM

SECCIÓN  
(SECTION)

PAGINA 20  
(PAGE)

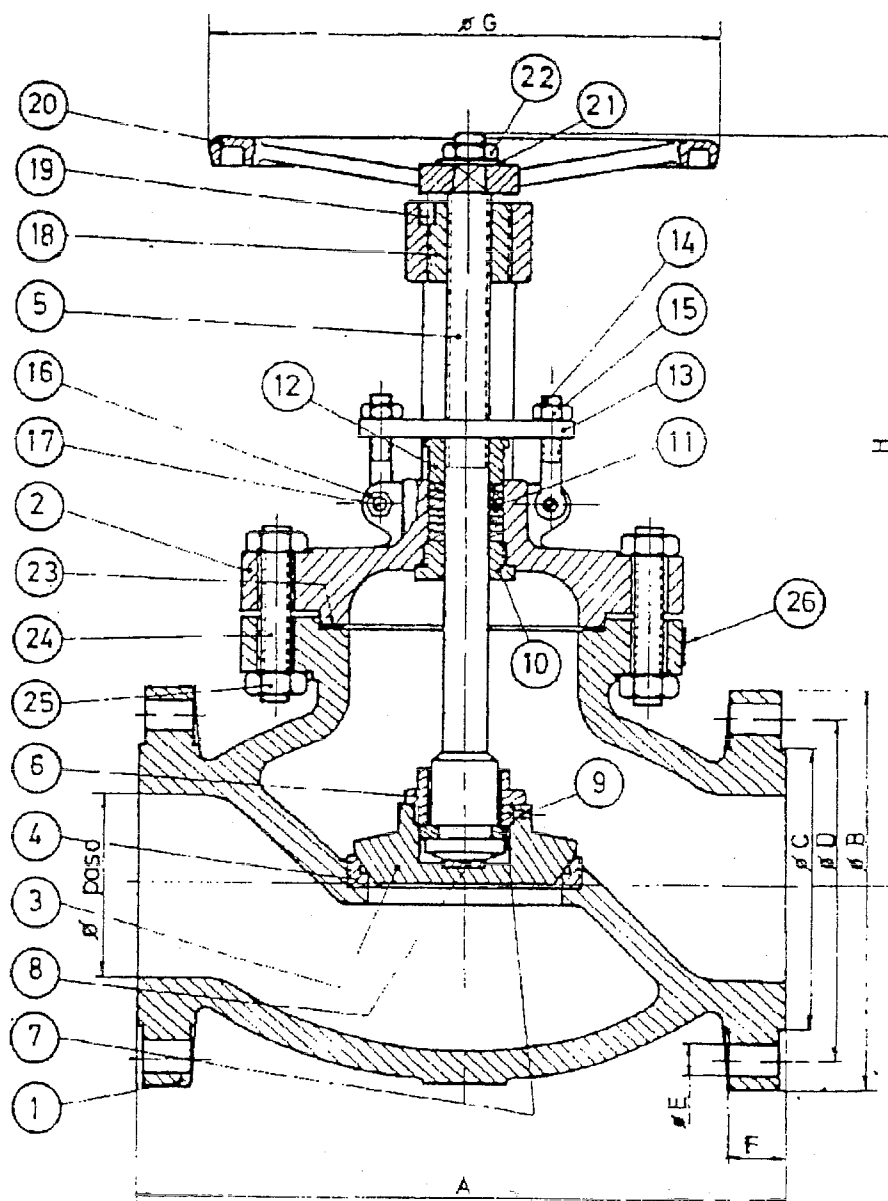
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" 0 03/03/93

" 1 22/02/95

" 2 10/04/98

## QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES GATE - GLOBE - CHECK



SIZE	A	B	C	D	E N° X Ø	F	G	H	
								OPEN	CLOSED
2"	203	152,4	92	120,6	4 DE 19	16	225	340	315
2 ½"	215,9	177,8	104,8	139,7	4 DE 19	17,5	225	365	340
3"	241,3	190,5	127	127	4 DE 19	19	275	420	380
3 ½"	266,7	215,9	139,7	139,7	8 DE 19	20,5	275	440	390
4"	292,1	228,6	157,2	157,2	8 DE 19	24	325	485	430
5"	330,2	254	185,7	185,7	8 DE 22	24	325	615	535
6"	355,6	279,4	215,9	215,9	8 DE 22	25,5	450	615	535
8"	495,3	342,9	270	270	8 DE 22	28,5	620	680	580
10"	622,3	406,4	323,8	323,8	12 DE 25	30,5	600	760	680
12"	698,5	482,6	381	381	12 DE 25	31,5	600	860	765

QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES  
GATE - GLOBE – CHECK

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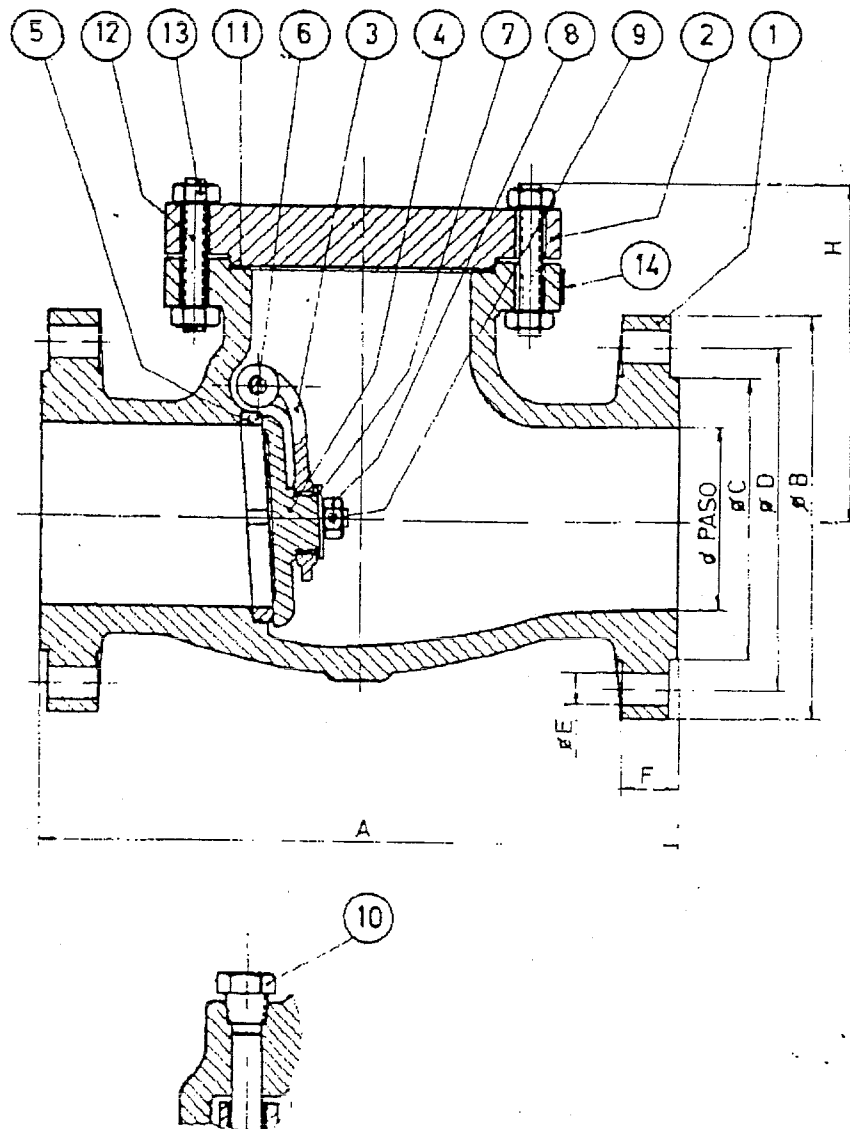
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**11.0. COMPONENTS OF CHECK VALVES**

- 1.- BODY
- 2.- BONNET
- 3.- DISC ARM
- 4.- VALVE FLAP
- 5.- SEAT RING
- 6.- DISC ARM PIN
- 7.- WASHER NUT PIN
- 8.- DISC NUT PIN
- 9.- SPLIT DISC NUT PIN
- 10.- HEXAGONAL DUST GUARD
- 11.- BODY-BONNET GASKET
- 12.- BODY-BONNET STUD
- 13.- BODY-BONNET NUTS
- 14.- IDENTIFICATION PLATE



QM002 MANUAL OF INSTRUCTIONS FOR MTS VALVES  
GATE - GLOBE - CHECK



SIZE	A	B	C	D	E N° X Ø	F	G	H
2"	203	152,4	92	120,6	4 DE 19	16	-	145
2 1/2"	215,9	177,8	104,8	139,7	4 DE 19	17,5	-	150
3"	241,3	190,5	127	127	4 DE 19	19	-	175
3 1/2"	266,7	215,9	139,7	139,7	8 DE 19	20,5	-	-
4"	292,1	228,6	157,2	157,2	8 DE 19	24	-	205
5"	330,2	254	185,7	185,7	8 DE 22	24	-	240
6"	355,6	279,4	215,9	215,9	8 DE 22	25,5	-	240
8"	495,3	342,9	270	270	8 DE 22	28,5	-	292
10"	622,3	406,4	323,8	323,8	12 DE 25	30,5	-	346
12"	698,5	482,6	381	381	12 DE 25	31,5	-	395

**12.0. OPERATIONS TO ASSEMBLE VALVES**

Take special care to see that no piece is damaged and that surfaces are as clean as possible (do a complete cleaning of the inside of the valve).

**12.1. Gate and globe valve (screwed body and bonnet.)**

- Introduce the stem through the back seat bushing (that it is screwed to the bonnet) and place the gland and the gland flange
- Screw the stem to the stem nut until the stem head stands out.
- Join the stem to the wedge or to the disc by means of the back seat bushings. This operation is carried out with the valve in open position.
- Introduce the studs to hold the body-bonnet (placing previously a new gasket) and tighten the nut crossed and strongly enough
- Place the stem packing, the eye bolt and the handwheel holding tied to the stem nut by means of the handwheel nut.

**12.2. Check Valve.**

- Adjust the disc arm to the valve flap, by means of a washer, nut and pin.
- Introduce the hinge pin through the body and disc-arm holes, thus forming a unit of body/hinge-pin/disc-arm/valve flap well assembled.
- Before placing the bonnet verify that the unit disc arm/valve flap swings without rubbing. If it were so, put the bonnet on the body.
- Screw the body to the bonnet by means of the studs and nuts, tighten them crossed (previously a new gasket has to be placed).