EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
CERN - SPS DIVISION

TECHNICAL SPECIFICATION

ALL-METAL ULTRA-HIGH VACUUM STRAIGHT THROUGH VALVES FOR THE SPS-VACUUM SYSTEM

Ref : SPS/AMR/HW/D1-59

Geneva, November 1979

C O N T E N T S

1. General Information

The present specification covers the supply of bakeable all-metal straight-through valves for the ultra-high vacuum systems in part of the experimental areas of the CERN SPS proton-antiproton colliding beam facility.

The vacuum systems in the experimental areas are of the all-metal type, mostly baked to 150°C. The average pressure will be less than 10^{-10} mbar. The permissible leak rate of a valve covered by the present specification is less than 10^{-9} mbar ℓ/s of helium

All conditions related to quantities, delivery time, manufacturing programme and progress reports, additional work or modifications, etc. are contained in the enclosed Tender Form and Special Conditions. The tender documents also include a technical questionnaire, and bidders are requested to give detailed information to allow the tender to be properly assessed.

One production prototype of the valve must be approved by CERN before the start of series production. The contractor shall not start any series production before having received notification in writing from CERN that such production may start.

2. Technical specification

2.1 General requirements

2.1.1 Dimensions and wall thickness

The valve must be of the straight-through type with a free passage of 400 mm in diameter.

The maximum permissible dimensions of the valve are given in the enclosed drawing (8095.2148.4).

2.1.2 Vacuum connections

The valve shall be equipped on both sides with fixed flanges of the JS0400 type.

2.1.3 Valve mechanism

The valve shall be pneumatically operated with a gate of the pendulum type. The driving mechanism of the valve shall be sealed by a metal bellows from the vacuum side of the valve. End-of-stroke contacts shall indicate the open or closed position of the valve.

A compressed air supply of 6 - 10 bars pressure shall be sufficient to operate the valve. The coils of the electromagnetic valves, commanding the compressed air, shall be of the 48V, AC type and must be capable of working continuously.

2.1.4 Materials

All vacuum exposed parts of the valve shall be made of austenitic stainless steel, titanium or other materials of the high quality type compatible with UHV applications.

The use of aluminium or aluminium alloys is not allowed.

The tenderer must submit together with the tender documents a list of all materials in the valve, (see also section 2.2.6).

2.1.5 Drawings

The tenderer must supply together with his offer a general layout drawing of the valve, giving all basic dimensions and containing all necessary information for the installation of the valve and also indicating the positions where one could possibly fit a small pumping port.

2.1.6 Instruction manuals

The manufacturer of the valve must supply together with the first batch of valves 5 instruction manuals containing also detailed drawings of all parts of the valve.

2.2 Performance requirements

2.2.1 Leak tightness

In the closed position, the leak rate on the seat of the valve shall not exceed 1×10^{-9} mbar ℓ/s of helium.

The leak rate of the valve body shall not exceed 1×10^{-9} mbar ℓ/s even after 50 bakeouts to 300°C.

2.2.2 Bake-out

The complete valve shall be bakeable in the closed as well as in the open position to 200°C without being damaged or losing in performance even after 50 bakeout cycles.

The valve shall remain fully operational up to 150°C (see also section 2.2.3).

2.2.3 Operation of the valve

The time to open and to close the valve should not exceed 3 sec.

The valve shall be fully operational without being damaged or losing in performance at a bakeout temperature of at least 150°C.

An electrical power failure shall lead to automatic closing of the valve. The closed valve shall remain leak tight for at least 12 hours in case the compressed air supply is missing.

2.2.4 Lifetime

The valve shall stand at least 1000 opening-closing cycles without losing the specified performance.

2.2.5 Outgassing rate

The total outgassing rate of the valve in the open or closed position shall be less than 5×10^{-7} mbar ℓ/s after 24 hours of pumping with a turbomolecular pump and without any bakeout. After a bakeout to 200°C for 24 hours, the outgassing rate shall be below 5×10^{-8} mbar ℓ/s.

2.2.6 Radiation Resistance

All parts of the valve shall be resistant against nuclear radiation up to 10^8 rad. The tenderer shall include a list of all non-metallic materials used for the valve (electrical insulations etc). Information on suitable materials can be obtained from CERN on request.

2.2.7 Mounting position

The valve shall be mountable and operational in any position. The valve body shall be equipped with conveniently located lifting lugs as well as with mounting brackets allowing the valve to be fitted on a support.

2.2.8 Maintenance

All parts of the valve, especially the sealing mechanism, shall be relatively easy to demount for maintenance. The manufacturer shall be prepared to give detailed information on the maintenance of the valves and also agree to train CERN staff to perform all normal maintenance operations.

3. Tests

3.1 Prototype valve

The prototype valve will be tested at CERN for conformity with the present specification.

If, after these tests, CERN finds that the prototype performs according to the present specification, the manufacturer will be informed in writing that series production may start.

The contractor is entitled to delegate a representative to attend the testing of the prototype.

3.2 Tests during fabrication

The contractor must decide which tests he thinks are necessary during manufacture of the valves. CERN would like to discuss these tests beforehand, but does not wish to impose a test programme.

3.3 Acceptance tests at CERN

All valves will be subjected to acceptance tests at CERN consisting mainly of :

- visual inspection
- functional test
- leak test

On an undetermined number of valves,also bakeout and lifetime tests will be performed.

Any valve that fails in the tests must be repaired or replaced by the contractor free of charge.

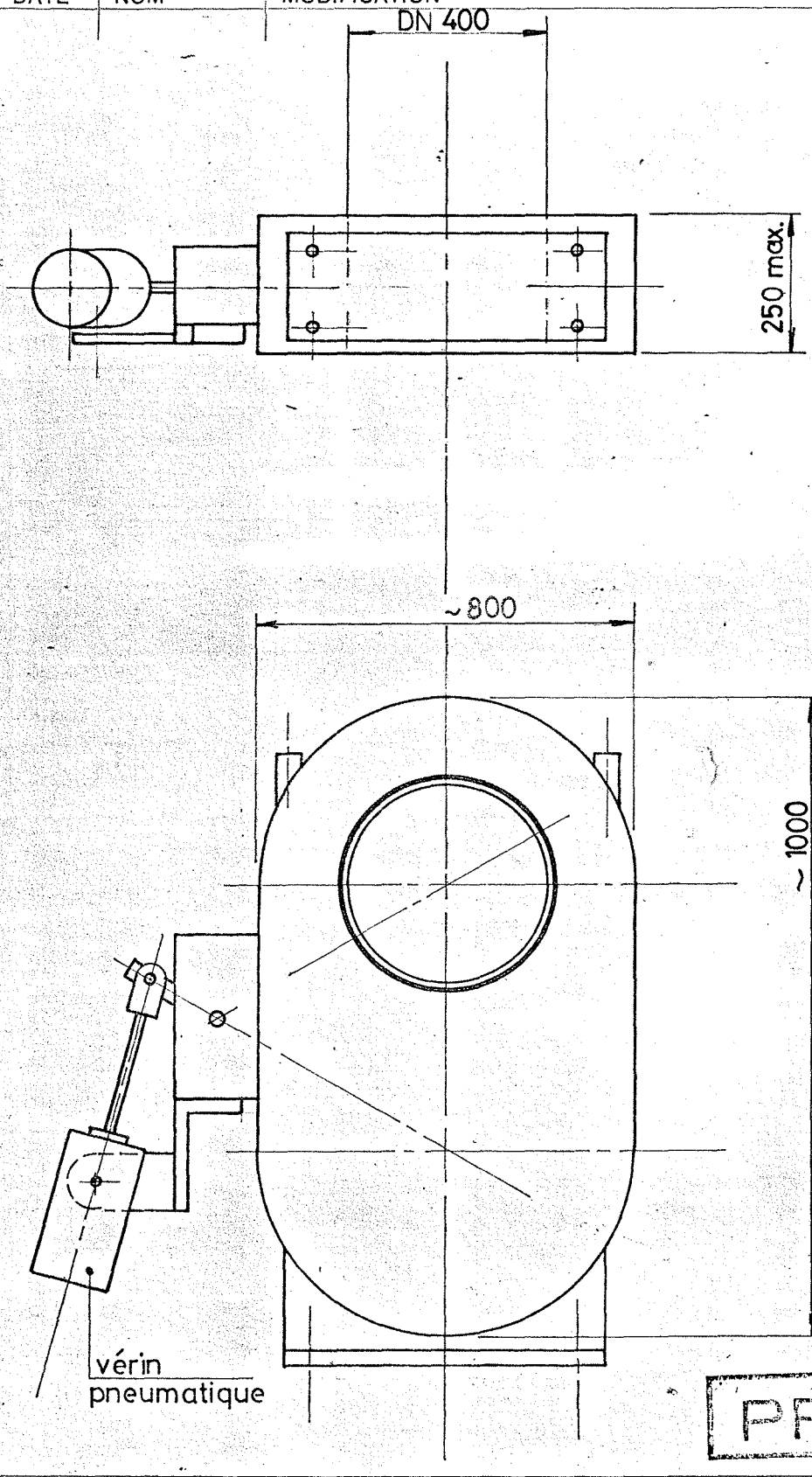
4. Drawings

INDICE	DATE	NOM	MODIFICATION

DIMENSION	> 1	> 30	> 120	> 315	> 1000	> 2000	
USINAGE	±0,2	±0,3	±0,5	±0,8	±1,2	±2	
MÉCANO-SOUDURE	±0,5	±0,8	±1	±2	±3	±4	

TOLÉRANCES GÉNÉRALES

DESSIN, RUGOSITÉ, TOLÉRANCES SELON NORMES ISO



NOMBRE PAR UNITÉ	DESCRIPTION	POS.	MATIÈRE	COTES BRUTES	FOURNISSEURS No SCEM
	ENSEMBLE		S. ENSEMBLE		

	NOM	DATE
DESSINÉ	CIENET	9-11-79
CONTRÔLÉ		
REMPLACE		
REMPLACÉ PAR		
RÉDUCTION		

VANNE ETUVABLE DN 400

ÉCHELLE SCALE —

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INDICE

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First angle projection