TECHNICAL REQUIREMENTS FOR ALL-METAL ULTRA-HIGH VACUUM RIGHT-ANGLE VALVES FOR THE SPS VACUUM SYSTEM

Type of valve	all metal right angle of the NW63 size
Flanges	NW63 Conflat type flanges on both sides
Valve mechanism	- pneumatically operated, maximum 8 bars of compressed air
	- electrical control components of the 48 V, AC type
	- end of stroke contacts for open and closed position
Materials	stainless steel, titanium or other UHV compatible materials
Leak tightness	10^{-10} mbar l/s on seat and valve body even after 50 bakeouts to 300°C
Bakeout	bakeable in closed or opened position up to 300°C
Operation	- opening and closing time should not exceed 5 secs
	- missing of electrical power shall close the valve automatically
	- the closed valve shall remain leak tight for at least 12 hours in case the compressed air supply is missing
	- mountable and operational in any position
	- operational at least up to 150°C
Lifetime	at least 1000 opening - closing cycles
Radiation resistance	against nuclear radiation up to 10^8 rad

SPS/AMR/HW/EEK 15th November, 1979

ADJUDICATION OF AN ORDER FOR THE SUPPLY OF ALL-METAL UHV VALVES FOR THE VACUUM SYSTEM OF THE CERN 400 GeV PROTON ACCELERATOR

TENDER I-1909/SPS/AC

INTRODUCTION

1. This adjudication refers to the invitation to tender I-1909/SPS/AC and concerns the supply of 20 all-metal UHV-valves.

2. The valves will be used on the ultra-high vacuum systems in the $p-\bar{p}$ experimental areas of the 400 GeV proton accelerator (SPS), where pressures below 10^{-10} torr must be achieved.

   In a major part of these systems the required pressures can only be obtained when using vacuum components bakeable to $300^{o}C$.

   The valves must remain fully operational up to a temperature of $150^{o}C$.

CALL FOR TENDERS

3. The call for tenders was sent out on 3rd July 1979, under reference FI/SAP/CW, to nine firms in 5 member states. The closing date for tenders was 7th September, 1979.

4. As the valves required are of a type calling for specialized knowledge regarding valve technology, materials and fabrication, only European firms likely to have similar valves in their manufacturing programme were contacted.

5. CERN received two tenders, five firms declined and two firms did not reply. Table I gives the list of firms contacted and their replies to the call for tender.

ANALYSIS OF THE TENDER

6. Table II shows the prices at the tender opening.

7. Both firms quoted fixed prices, not subject to price revision.

8. The lowest offer was submitted by VARIAN SpA, Torino, Italy. Varian did not include valve control equipment in their tender as this was not requested by CERN.

9. VARIAN accepted the delivery schedule proposed by CERN.

10. VARIAN stated in their tender that their valves could be baked only to 200°C and furthermore, that the valves could only be operated below 70°C.

Therefore the VARIAN valve does not fulfil the CERN specification concerning bakeout temperatures.

11. A valve of the type proposed by VARIAN was tested at CERN. This valve started to leak heavily after less than 50 operating cycles at room temperature.

CERN specified the lifetime of the valves to correspond to 1000 opening-closing cycles without loss of performance. Therefore the VARIAN valve does not fulfil the CERN specification concerning lifetime.

12. VARIAN stated in their tender that the outgassing rates are 9×10^{-7} torr ℓ/s after 24 hours of pumping without bakeout and 5×10^{-8} torr ℓ/s after a 24 hour bakeout.

These values are a factor of 10 higher than the values specified by CERN. Therefore the VARIAN valve does not fulfil the CERN specification concerning the outgassing rates.

13. The valves proposed by VARIAN are manufactured entirely in the USA.

14. VAT A.G., Haag, Switzerland, submitted the second lowest offer.

15. The prices quoted by VAT includes also the necessary controls for the valves. The price for these controls amounts to 2900.- FS per valve as quoted by VAT in telex No. 12063 dated 19.9.79.

16. VAT did not accept the delivery schedule proposed by CERN, but asked an additional 6 weeks delay between the prototype delivery and the start of the series deliveries.

    Deliveries would, however, be completed within the time schedule requested by CERN.

17. A valve of the type proposed by VAT was tested at CERN and fulfils the CERN specification.

18. The valves proposed by VAT are manufactured in Switzerland.

CONCLUSION

19. The only technically acceptable offer was made by VAT AG.

20. Recent machine studies have shown that at present at least 30 valves are required. Possible future requirements should be covered by an option in the order.

21. The total price, CIF CERN, of 30 valves is FS 476'250.- including the complete electro-units for the valves.

RECOMMENDATION

22. It is recommended that an order be placed with VAT AG, Haag, for the supply of 30 all-metal UHV vavles for a total sum of FS 476'250.- The order shall also contain an option according to section 3, list B, of the tender form.

TABLE I

Country	Firm	Reply
Switzerland	Balzers, AG, Zürich	Declined
Switzerland	VAT AG, Haag,	Tender
Germany	Leybold-Heraeus, Köln	Declined
France	Alcatel, Annecy	No reply
France	Riber, Reuil-Malmaison	Declined
England	Edwards, Crawley	Declined
England	Vacuum Generators, Hastings	Declined
Italy	Officine Galileo, Firenze	No reply
Italy	VARIAN, Torino	Tender

TABLE II

Prices of the opening of the tenders

(in Swiss Francs)

FIRM	Total price for 20 valves	Single prices for optional valves according to list A up to 4 valves	Single prices for optional valves according to list A up to 10 valves	Single prices for optional valves according to list B up to 4 valves	Single prices for optional valves according to list B up to 10 valves
Varian SPA	215.800.-	10790.-	10790.-	11380.-	11330.-
VAT AG (valves + controls)	317.500.- 1)	17500.- 1)	17000.- 1)	17900.- 1)	17400.- 1)
VAT AG (valves only)	259.100.- 2)	14600.- 2)	14100.- 2)	15000.- 2)	14500.- 2)

1) Prices given in tender including the necessary controls.

2) Price for valves without controls (deduction of FS 2900.- per valve as quoted in telex No. 12063 dated 19.9.79).