

**Meeting 15-11-2004**

# **Status of the ISCOOL project- November 2004**

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## **Abstract**

The following document reports the status of the ISCOOL project in November 2004. Status of the manufacturing of the mechanical design, and cost expected or already spent in vacuum and electronics system are detailed for the RFQCB (RadioFrequency Cooler and Buncher).

Geneva, Switzerland  
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## 1. Items spent in the project so far

EDH number	Type	Item	Price [CHF]	Number	Budget code Description
1531290	DAI	4 High voltage insulators	18228	T131900	ISOLDE
1553747	MAG	Pocket rule	6.2	67100	OP general
1614373	MAG	HV safety interlocks for b. 275	75	67535	ISOLDE consolidation generale
1626762	MAG	Material vacuum chamber RFQCB	2864.29	31560	ISOLDE - Physics
1630588	DAI	Pfeiffer material main vacuum chamber	1454	31560	ISOLDE - Physics
		HV cage building 275	4320	T131900-5c	ISOLDE
		Bend of metal sheet	295	31560	ISOLDE-Physics
1646193	JOB	Fabrication axial electrodes	3922	67535	ISOLDE consolidation generale
1629785	SHIP2	Transport main chamber material to Mainz	140	67535	ISOLDE consolidation generale
1648385	MAG	Flange for ISOLDE Scanner	54.39	67535	ISOLDE consolidation generale
165024	DAI	24 V Siemens Power supply	198	67535	ISOLDE consolidation generale
	EP	Picoammeter Kethley 6487 (rent/month)	188.99367	67535	ISOLDE consolidation generale
1655824	SHIP2	Transport bend metal sheet to Mainz		67535	ISOLDE consolidation generale
1654640	MAG	Material for support of emittance meter and REX box	225.87	67535	ISOLDE consolidation generale
1654615	MAG	HV safety tools for building 275	269.7	67535	ISOLDE consolidation generale
1658822	MAG	Flange for transition piece beam b275	298	67535	ISOLDE consolidation generale
406690 (urg)	URG	Cable and plug for building 275	115	T131900	ISOLDE-Physics
1661684	DAI	Clamps for ISO-K 100 b275	267	67535	ISOLDE consolidation generale
1662242	MAG	Material support emittance meter	7.92	67535	ISOLDE consolidation generale
1668048	MAG	Material building 275 (electrical and tubes prepumps)	216	67535	ISOLDE consolidation generale
	MAG	Stiffeners for MISTRAL electronics HV cage door	22.5	31560	ISOLDE-Physics
		Axial electrodes metrology	1000	67535	ISOLDE consolidation generale

**TOTAL COST 2004 34167.9**

## 2. Mechanical design

### 2.1. Status of the design

Following table shows the items already with a manufacturing drawing ready.

<b>ISLRFQCB0001</b>	RFQ SUPPORT ASSEMBLY - LOWER PLATE
<b>ISLRFQCB0002</b>	RFQ SUPPORT ASSEMBLY - INSULATOR
<b>ISLRFQCB0003</b>	RFQ SUPPORT ASSEMBLY - INTERMEDIATE PLATE

<b>ISLRFQCB0004</b>	RFQ ASSEMBLY - SPECIAL SCREW
<b>ISLRFQCB0005</b>	RFQ ASSEMBLY - COVER
<b>ISLRFQCB0006</b>	RFQ ASSEMBLY - SUPPORT
<b>ISLRFQCB0007</b>	RFQ ASSEMBLY - SUPPORT
<b>ISLRFQCB0008</b>	ENSEMBLE ENCEINTE A VIDE POUR RFQ - VACUUM CHAMBER (FINAL MACHINING)
<b>ISLRFQCB0009</b>	RFQ VACUUM CHAMBER ASSEMBLY – VACUUM CHAMBER (ROUGHING)
<b>ISLRFQCB0010</b>	RFQ VACUUM TANK ASSEMBLY - BASE
<b>ISLRFQCB0011</b>	RFQ SUPPORT ASSEMBLY - TROLLEY
<b>ISLRFQCB0012</b>	RFQ SUPPORT ASSEMBLY - THREADED HUB
<b>ISLRFQCB0013</b>	RFQ SUPPORT ASSEMBLY - BLOCK
<b>ISLRFQCB0014</b>	RFQ SUPPORT ASSEMBLY - ADJUSTMENT SCREW
<b>ISLRFQCB0015</b>	RFQ SUPPORT ASSEMBLY - UPPER ADJUSTMENT TABLE
<b>ISLRFQCB0016</b>	ADJUSTMENT TABLE ASSEMBLY - BLOCK
<b>ISLRFQCB0017</b>	RFQ SUPPORT ASSEMBLY - FLAT BAR FOR VACUUM CHAMBER SUPPORT
<b>ISLRFQCB0018</b>	RFQ SUPPORT ASSEMBLY - STRAP FOR VACUUM CHAMBER SUPPORT
<b>ISLRFQCB0019</b>	RFQ ASSEMBLY - END FLANGE / EXTRACTION
<b>ISLRFQCB0020</b>	RFQ ASSEMBLY - END FLANGE / INJECTION
<b>ISLRFQCB0021</b>	RFQ ASSEMBLY - CELL L=27 MM (TO BE ADJUSTED)
<b>ISLRFQCB0022</b>	RFQ ASSEMBLY - CELL L= 39 MM
<b>ISLRFQCB0023</b>	RFQ ASSEMBLY - INSULATING RING
<b>ISLRFQCB0024</b>	RFQ ASSEMBLY - INJECTION DISC
<b>ISLRFQCB0025</b>	RFQ ASSEMBLY - EXTRACTION DISC
<b>ISLRFQCB0026</b>	RFQ ASSEMBLY - INSULATING WASHER
<b>ISLRFQCB0027</b>	RFQ ASSEMBLY - CELL L=19 MM
<b>ISLRFQCB0028</b>	RFQ ASSEMBLY - CELL L=9 MM
<b>ISLRFQCB0030</b>	RFQ ASSEMBLY - CYLINDER
<b>ISLRFQCB0031</b>	RFQ ASSEMBLY - IRIS
<b>ISLRFQCB0032</b>	RFQ ASSEMBLY - ELECTRODE INSULATOR L= 100MM
<b>ISLRFQCB0033</b>	RFQ ASSEMBLY - ELECTRODE
<b>ISLRFQCB0034</b>	RFQ ASSEMBLY - ELECTRODE INSULATOR L= 85MM
<b>ISLRFQCB0035</b>	RFQ ASSEMBLY - INSULATING DISC
<b>ISLRFQCB0036</b>	EXTERNAL EXTRACTION ELECTROD ASSY - SECONDARY ELECTROD / SUPPORT
<b>ISLRFQCB0037</b>	INJECTION EXTERNAL ELECTROD ASSY - PRIMARY ELECTRODE
<b>ISLRFQCB0038</b>	INJECTION EXTERNAL ELECTROD ASSY - SECONDARY ELECTROD / SUPPORT
<b>ISLRFQCB0039</b>	INJECTION EXTERNAL ELECTROD ASSY - SECONDARY ELECTROD
<b>ISLRFQCB0040</b>	RFQ ASSEMBLY - INSULATING PIN

For the RFQCB only the manufacturing drawings for the injection and extraction ground electrodes are missing. For the whole beam line, manufacturing drawings for the injection and extraction quadrupole triplets and the support for them are also missing.

## 2.2. Status of the manufacturing

Following table shows the present situation of the items that are being manufactured in the different suppliers, already manufactured or waiting for offers. Codes of the piece corresponds to the status of the design table.

Piece	Quantity	Manufacturer	Status	Delivery date	Tests and processes
<b>Vacuum chamber</b> ISLRFQCB005, 008 and 009	1	University of Mainz	In workshop	Nov-04	First polish at university supersonic cleaning at CERN? metrology?
<b>Axial electrodes</b> ISLRFQCB21, 22, 27 and 28	39mm x19, 19mm x10, 9mm x10, 27mm x1	LINDENTHAL	Cleaning left	Delivered	Metrology at CERN done (EDMS docs)  Cleaning left
<b>First bunch Munich</b>					
ISLRFQCB002	4	LMU	In workshop	?	
ISLRFQCB003	1	LMU	In workshop	?	
ISLRFQCB012	4	LMU	In workshop	?	
ISLRFQCB013	3	LMU	In workshop	?	
ISLRFQCB014	4	LMU	In workshop	?	
ISLRFQCB015	1	LMU	In workshop	?	
ISLRFQCB016	6	LMU	In workshop	?	
ISLRFQCB017	1	LMU	In workshop	?	
ISLRFQCB018	1	LMU	In workshop	?	
<b>Trolley/support</b>					
ISLRFQCB011	1	CSNSM-Orsay	In workshop	?	
<b>Second bunch Munich</b>					
ISLRFQCB004	6	LMU	In workshop	?	
ISLRFQCB006	1	LMU	In workshop	?	
ISLRFQCB007	1	LMU	In workshop	?	
ISLRFQCB019	1	LMU	In workshop	?	
ISLRFQCB020	1	LMU	In workshop	?	
ISLRFQCB024	1	LMU	In workshop	?	
ISLRFQCB025	1	LMU	In workshop	?	
ISLRFQCB031	2 sets of 8	LMU	In workshop	?	
<b>ISLRFQCB033</b>	4	?	?	?	
<b>ISLRFQCB036</b>	1	?	?	?	
<b>ISLRFQCB037</b>	1	?	?	?	
<b>ISLRFQCB038</b>	1	?	?	?	
<b>ISLRFQCB039</b>	1	?	?	?	
<b>Big insulators 60 kV</b>	4	FRIATEC	Received		Vacuum test? Leaking test?
<b>Small insulators</b>			Offers from CERN external suppliers waiting		
ISLRFQCB023	20				
ISLRFQCB026	20				
ISLRFQCB030	10				
ISLRFQCB033	10				
ISLRFQCB034	1				

Manufacturing drawings for the injection and extraction ground electrodes and quadrupole triplets are missing.

### 2.3. Other mechanical topics

- Small mechanical components need to be bought e. g. wheels for the trailer, gas pipes,...
- Manpower support for the assembly of the RFQCB components would be very useful.
- Find a location to short-term store and another to pre-assembly the RFQCB parts (ISOLDE target workshop?).

## 3. Vacuum system

Table below shows an estimation of the vacuum system cost for the project. It includes the vacuum pumps, the gas system components but also bellows, cross-pieces and other mechanical vacuum components.

VACUUM PARTS	Price (CHF)	Price (€)
<b>Turbomolecular pumps</b>	83000	52532
<i>Pfeiffer pumps offer 31.07.03</i>	83000	52532
<i>Leybold pumps offer 03-323</i>	70500	44620
<b>Forepumps</b>	12156	7693.5
<i>Alcatel offer</i>	12156	7693.5
<b>6 Cross-piece</b>	6917	4378
<i>Caburn (2 items)</i>	6917	4378
<b>Bellows</b>	4140	2620
<i>Pfeiffer (2 bellows DN200)</i>	2560	1620
<i>Special bellow VAT</i>	1580	1000
<b>Gauges</b>	7144	4522
<i>Piranni (2 Pfeiffer, price EDH-CERN)</i>	1246	789
<i>Penning (3 Pfeiffer, price EDH-CERN)</i>	3630	2297
<i>DualGauge (3 Pfeiffer, price EDH-CERN)</i>	2268	1435
<b>Valves</b>	40750	25791
<i>VAT (5 gate valves DN200)</i>	40750	25791
<b>TOTAL</b>	<b>154107</b>	<b>97536</b>

Once the orders for, e.g. VAT bellow, 5-6 weeks of delivery delay are to be expected.

## 4. Electronics system

### 4.1. DC electronics

The DC components (see table below) for control of the RFQCB have been already ordered (beginning November 2004). The orders are managed by AB-PO (J. Parra) and AB-CO (F. Locci) following the requirements specified. 3 or 4 months is the estimated delay for the total implementation of the electronics in building 275 (March 2005?). Insulation supports for the 60 kV electronic platform in building 275 have to be designed and constructed.

Electronics for injection and extraction triplets at the on-line beam line will be still missing.

<b>DC electronics for RFQCB</b>	<b>CHF</b>
<b>High voltage power supply 65 kV</b>	11000
<b>Isolation transformer</b>	9000
<b>Chassis comande transfo</b>	8000
<b>Chassis interlock haute tension</b>	4000
<b>Cablage</b>	15000
<b>1 external rack interlock HV</b>	1000
<b>Distribution electric fix (ST-EL)</b>	?
<b>Control (AB-CO)?</b>	?
<b>Small DC supplies (with 1 chassis)</b>	27450
<b>TOTAL</b>	<b>75450</b>

#### 4.2. RF amplifier

With a estimated cost about 6000 CHF (4000 €), the RF amplifier has the requirements (RF frequency, voltage amplitude...) well specified, but **support for an adaptation** of a former design (Jyvaskyla, LPC-Caen) **and construction would be required**.

#### 4.3. Electrical feedthroughs

To be bought (for DC and RF).

### 5. On-line beam line at ISOLDE hall

For an implementation at the ISOLDE hall, the main items that should be thought that are still missing are:

- Design of quadrupole triplets (mechanics and electronics) and their mechanical supports.
- Implementation of the on-line vacuum control.
- On-line application for the control of the RFQCB from the standard ISOLDE control system.
- Placement of the HV electronics platform and gas bottle at the ISOLDE hall.
- Faraday cage wall closing all the beam line section.

### 6. Test bench at building 275

Surface ion source tests done but not plasma (necessity to change the heating filament of the ion source). Probability of moving back the ion source in late spring would require another solution for the off-line tests. Some modifications of the safety in combination with the front-end tests are needed.