

# RPC readiness for Installation: ISR test activity

A.Colaleo CMS Week 8-06-2004



**116 chambers are at ISR on special stoking trolleys**

**83 chambers have been tested:**

**75 accepted**

**1 under observation**

**5 rejected for high current**

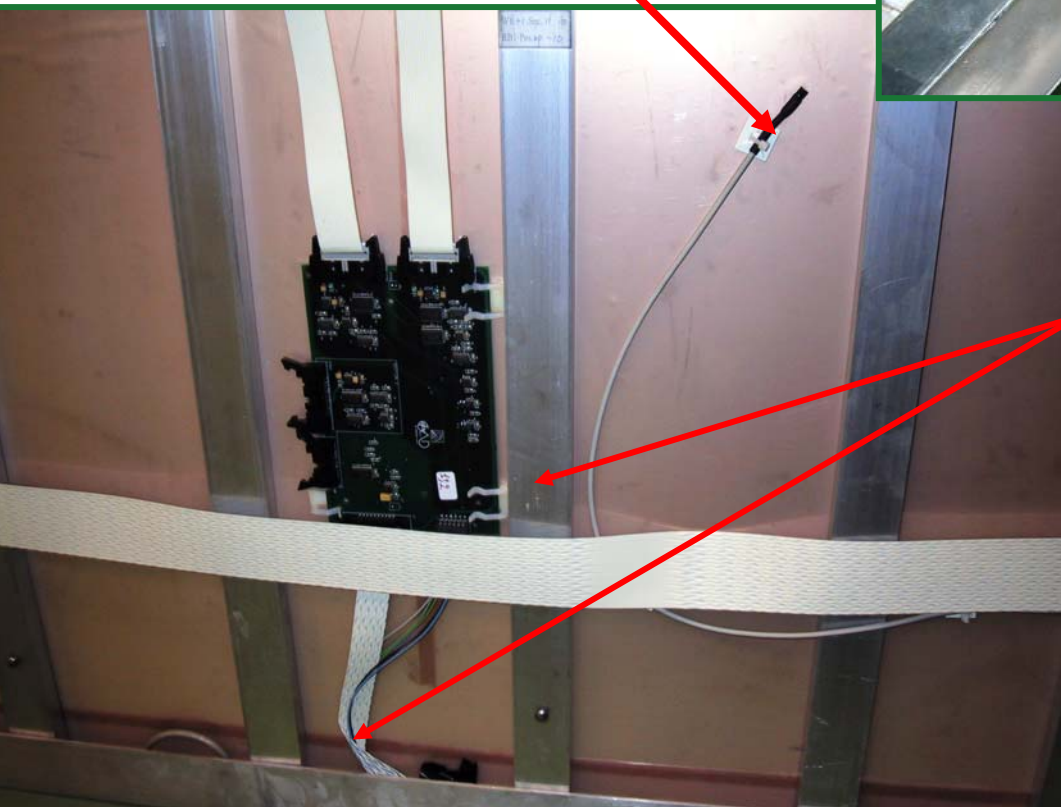
**2 rejected for gas leak**

**27 chambers are arriving at CERN next Wednesday**

## Work on chambers arriving at ISR

- HV final connectors on some chambers

- Temperature Sensors



- Control board - cable often need to be changed after the transport.
- Found 2/76 chambers with disconnected signal cables
- 3 FEBs changed

# Test procedures at ISR

Gas leak test

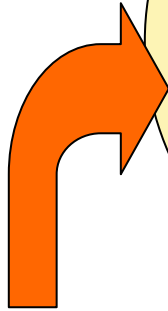
**NEW**

**Detector control**

**Chamber performances  
(in single and double gap)**

LV distribution board:  
Threshold setting/reading  
I vs. HV  
I vs. time

Single rate (hits count.) vs. HV  
Noise rate (cluster count.) vs. HV  
Cluster size vs. HV  
efficiency



Go to  
ITALY

rejected

DB update



Stocking  
trolley

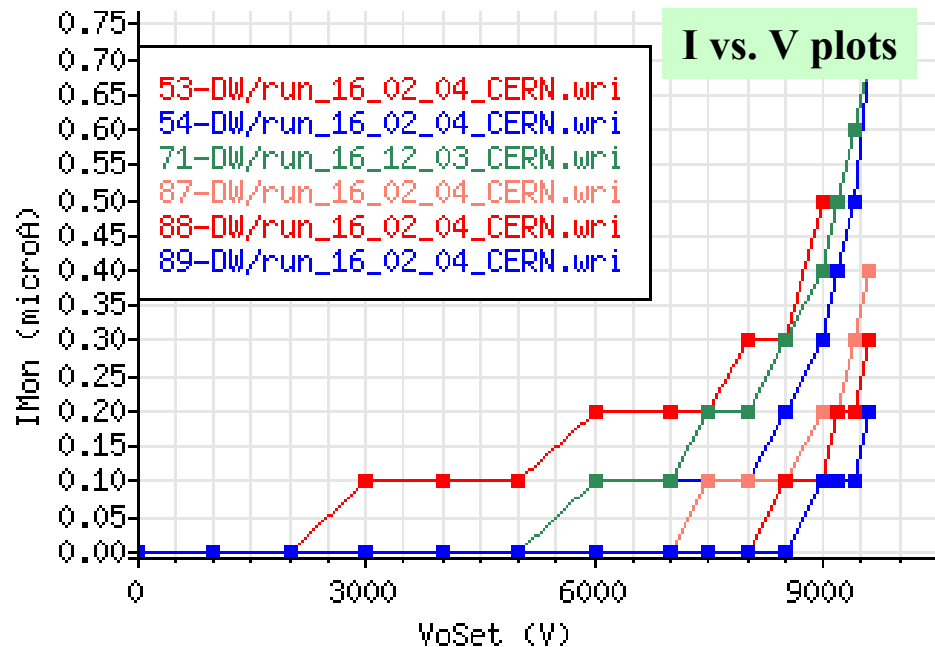
On wait

Accepted



# Results: Currents

- I vs. V plots during the tests
- Current stability for ~15-20 days
- Chambers suspicious have been monitored for > 1 month

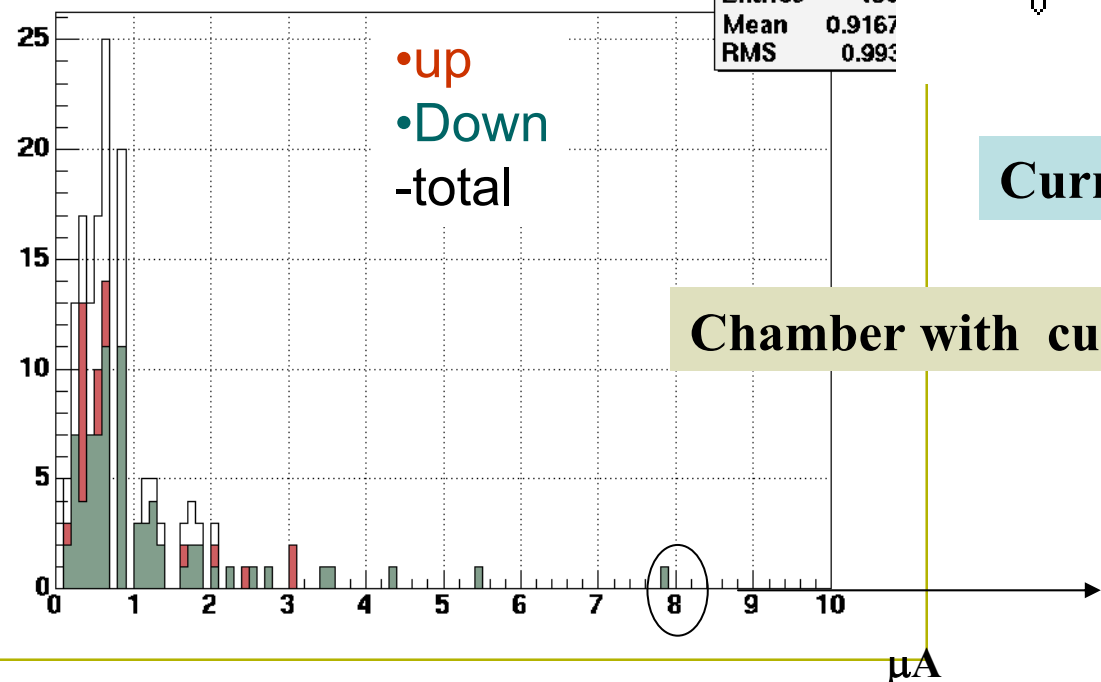


**Current@9400 V**

**Chamber with current/layer > 10 μA are rejected**

**Chamber ID 102.  
Long time monitoring , recovered and accepted**

**ISR chambers**



μA

# Results: Currents vs Time

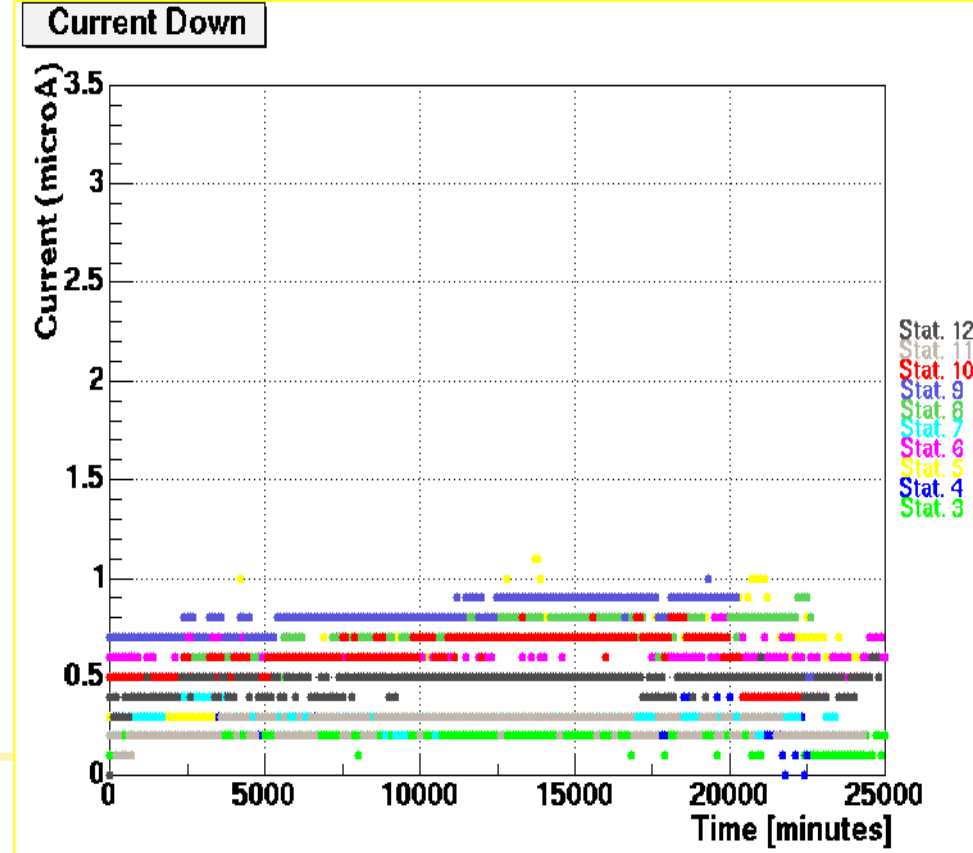
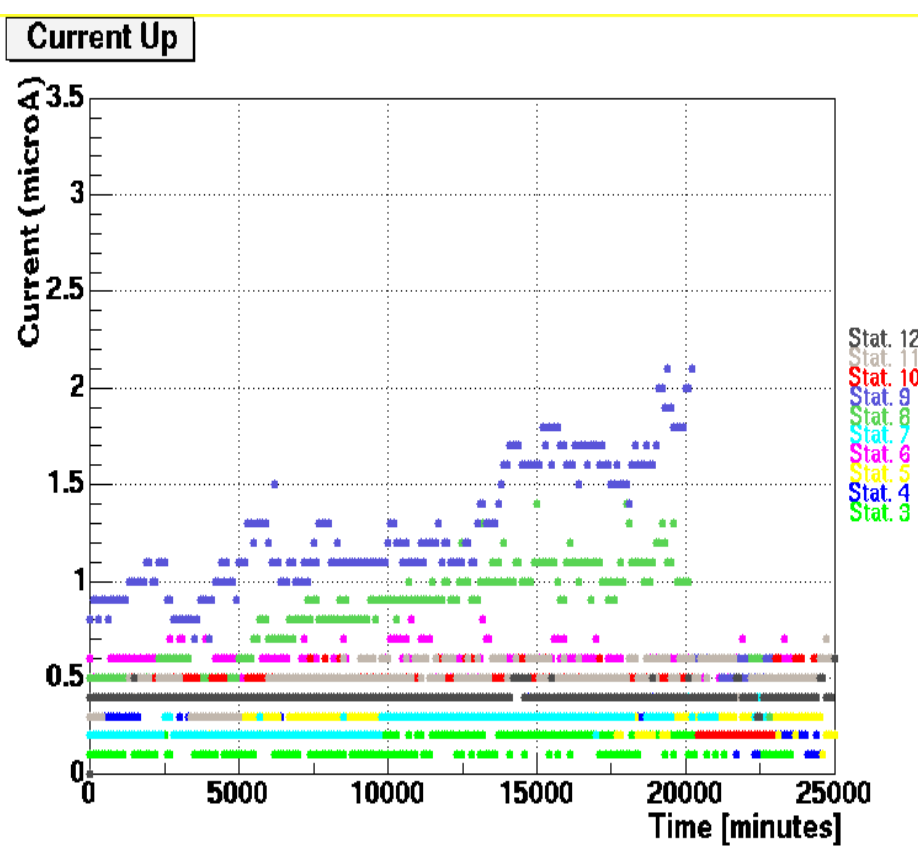
Monitor the current stability @ 9200 V vs time for at least 15 -20 days



On the test trolley for about 1 month

Last Chambers: LAYER UP

Last Chambers: LAYER DOWN

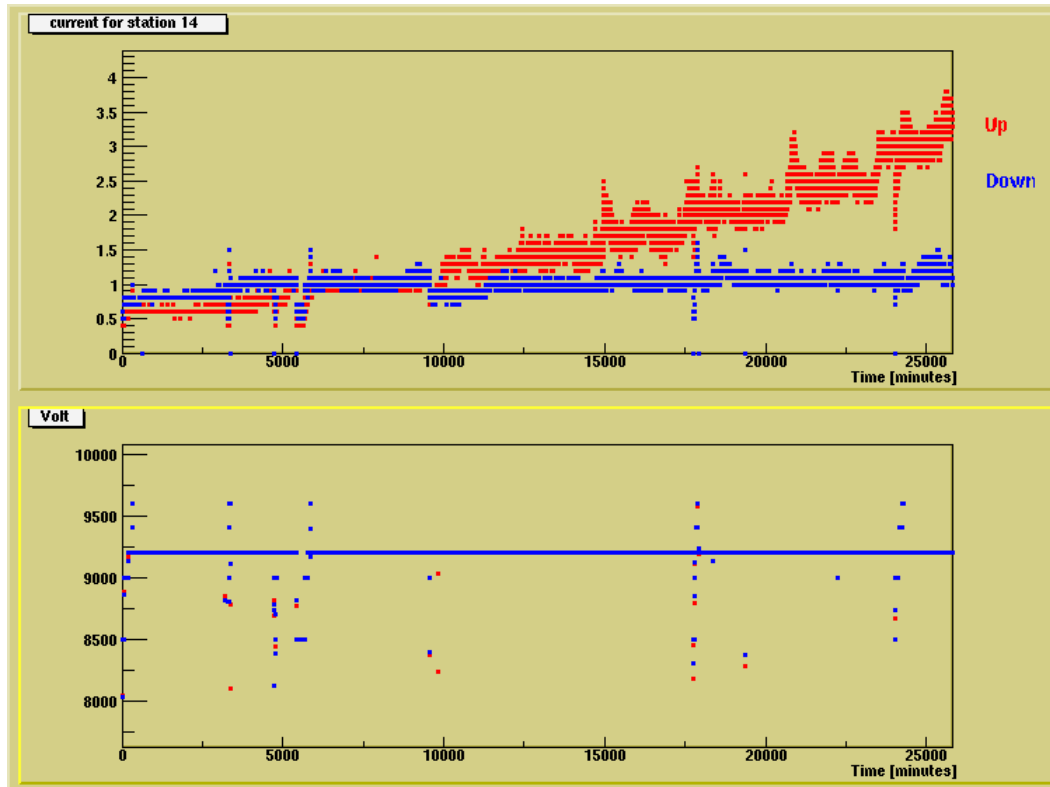




# Results: Currents vs. Time

5 rejected for steady increasing of current : chID 98 57 58 61 120

ChID 50 now under observation



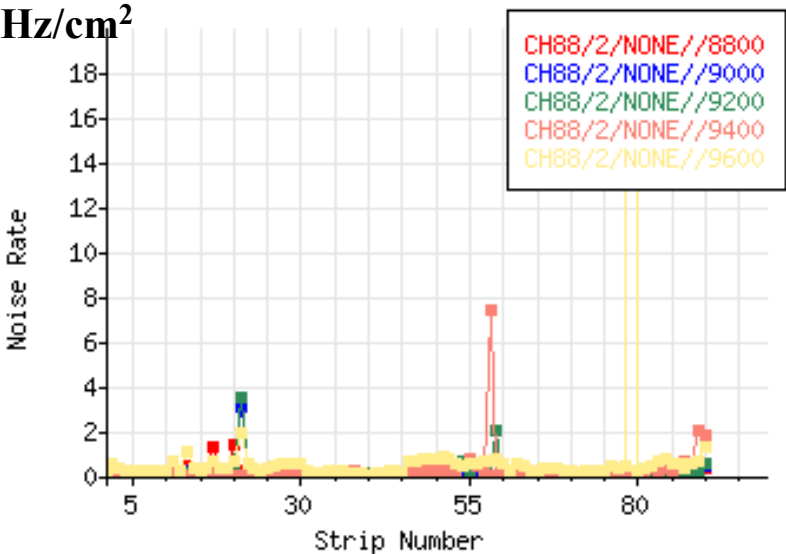
Recovering procedure: HV off for ~1 month  
slowly increasing of HV

# Results: noise rate

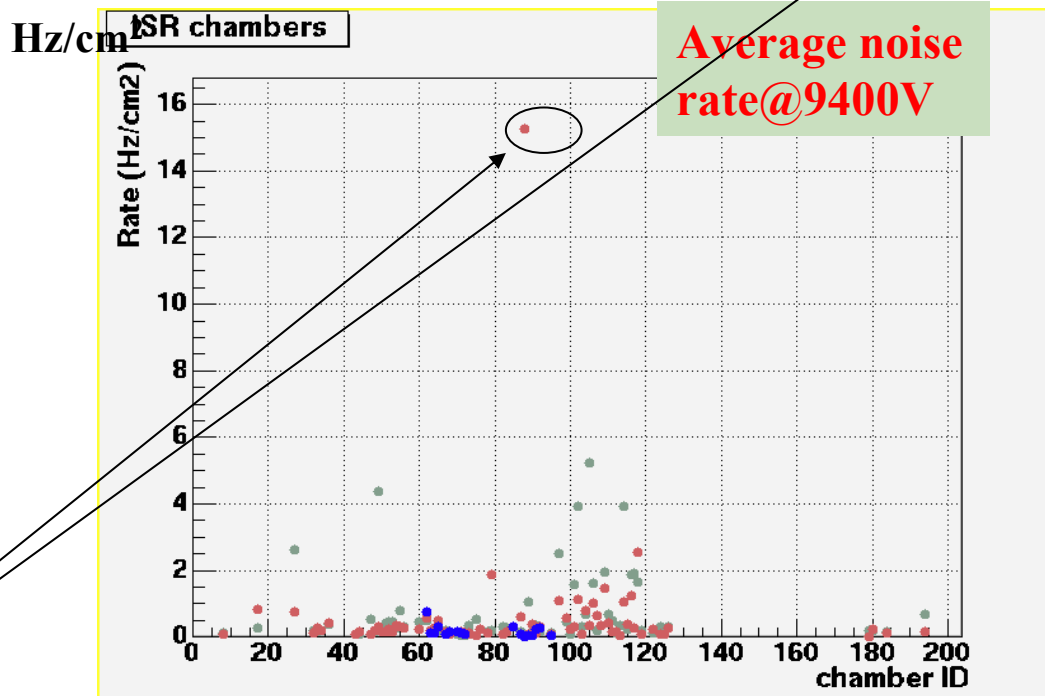
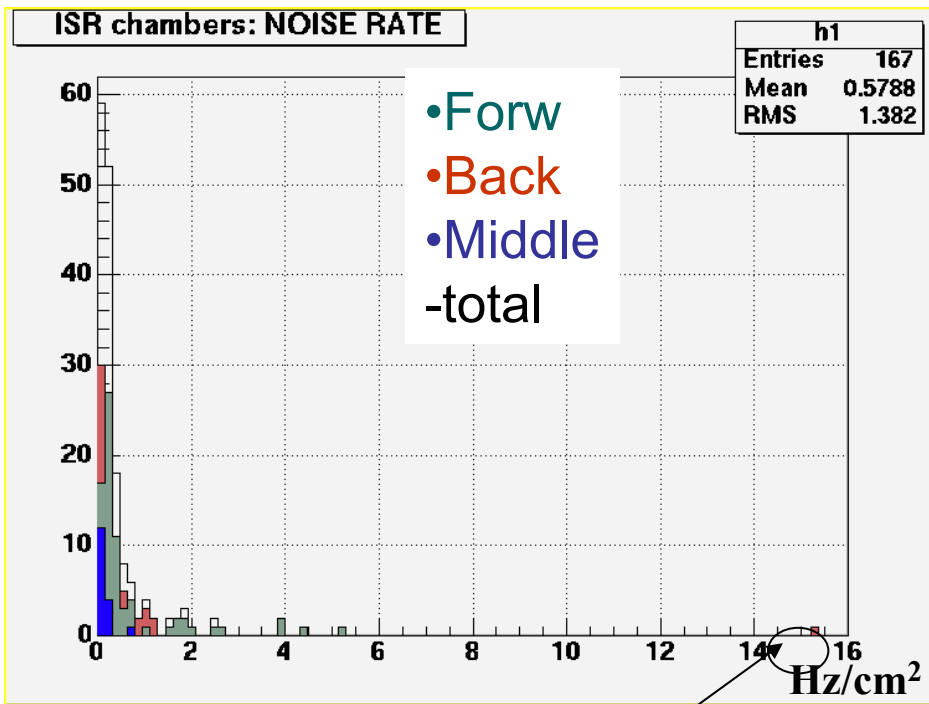
Random trigger runs in single and double gaps

- Hit rate profile: noise, dead strips
- Average noise rate by cluster counting

Hit rate profiles chID 88 between 8.8-9.6 kV

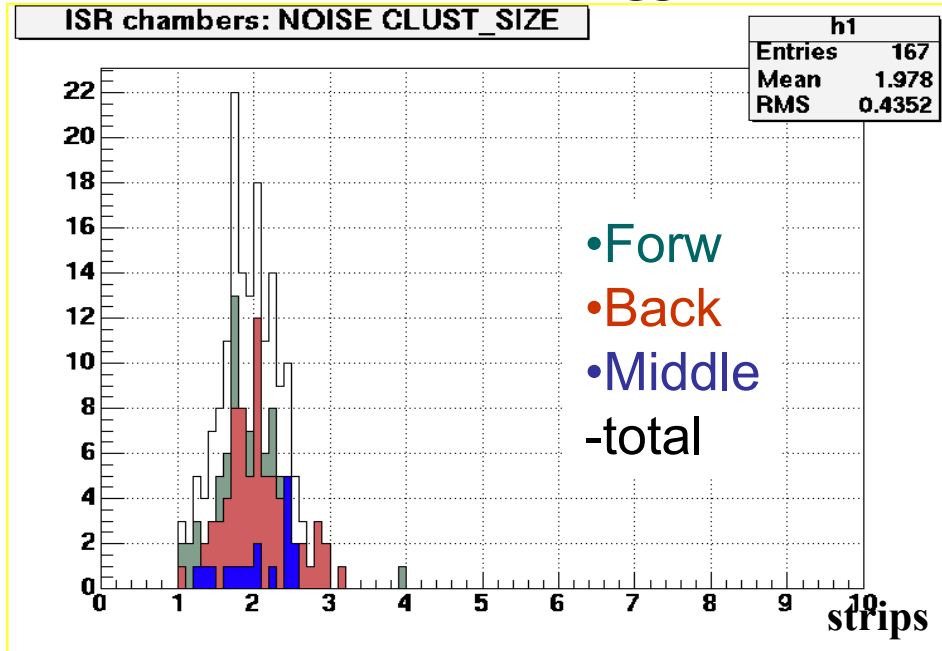


Single run with few, not continuously, noisy strips are accepted



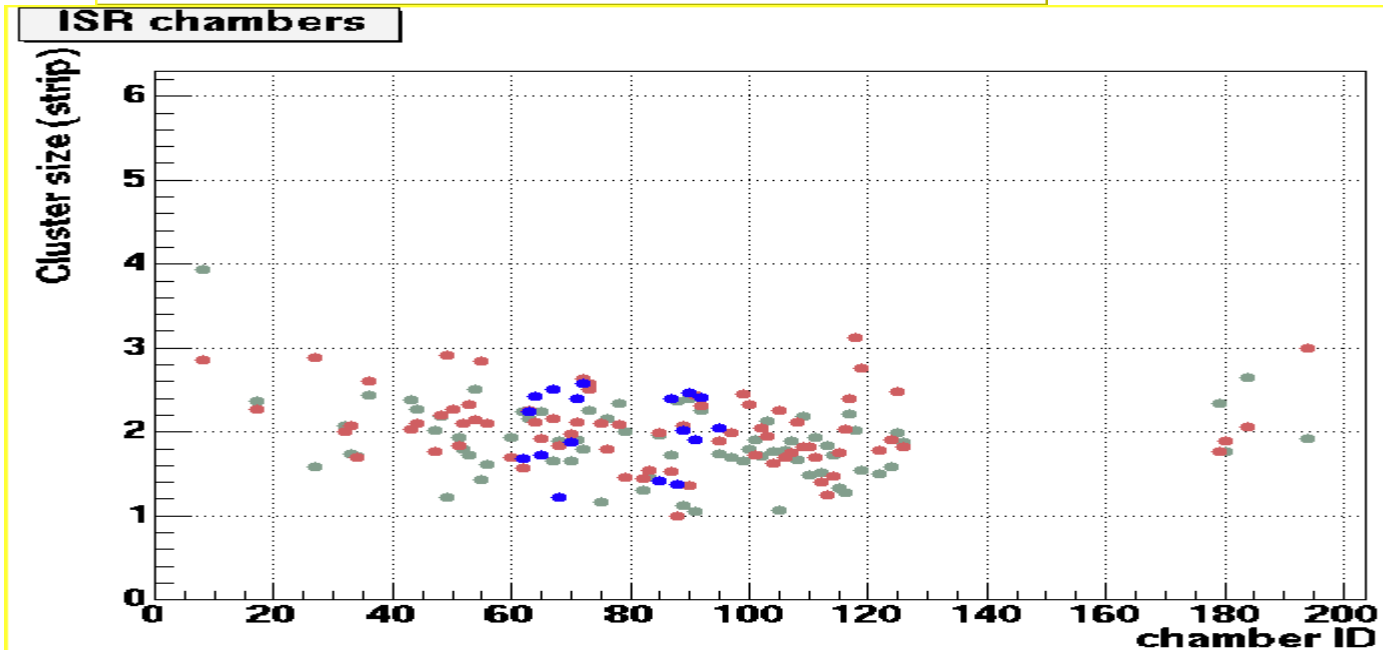
# Results: cluster size

## Random trigger runs: cluster size in noise events



75 Forw + 75 Back + 17 Middle

Mean cluster size < 2 strips

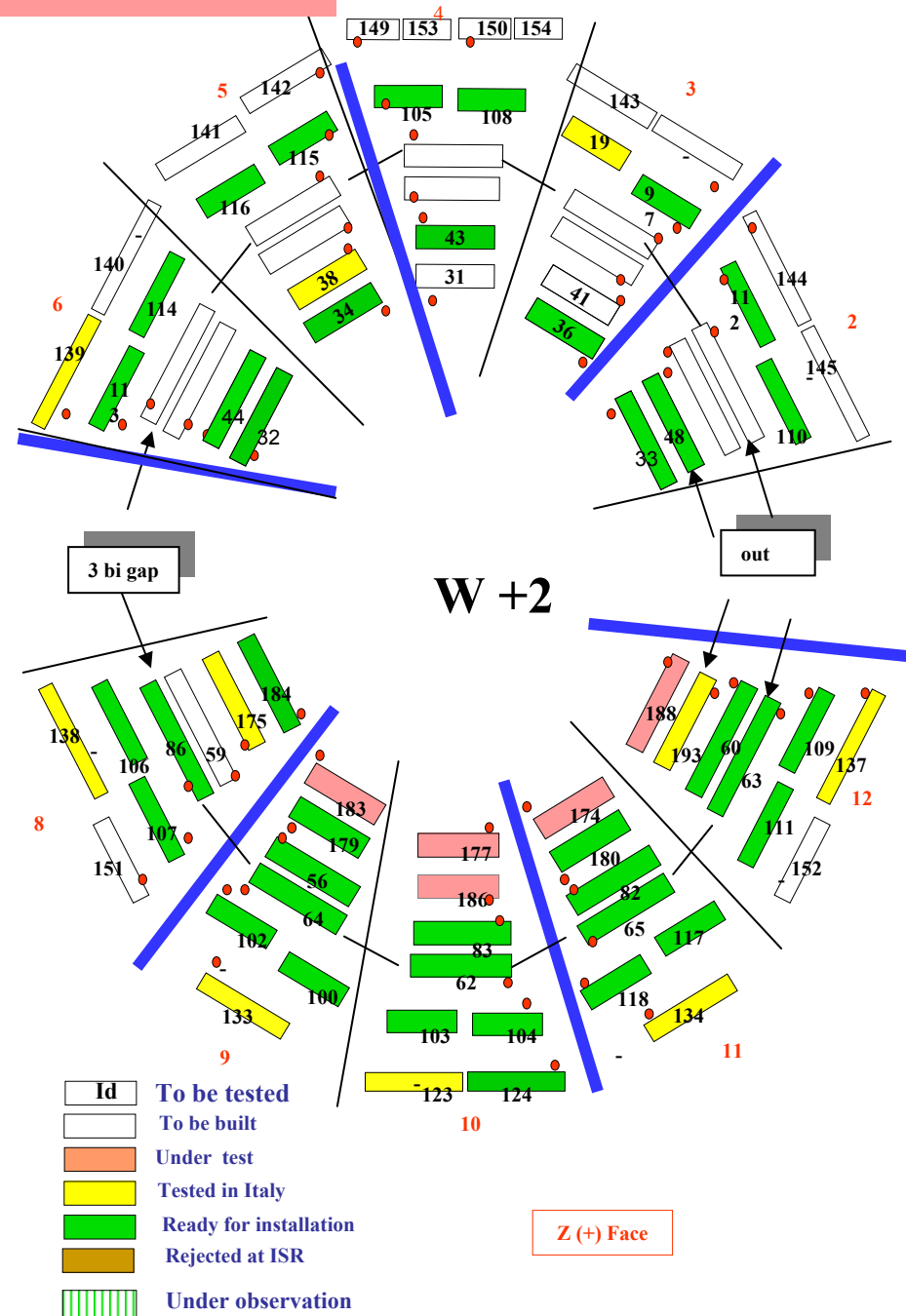




# RPC readiness for the installation

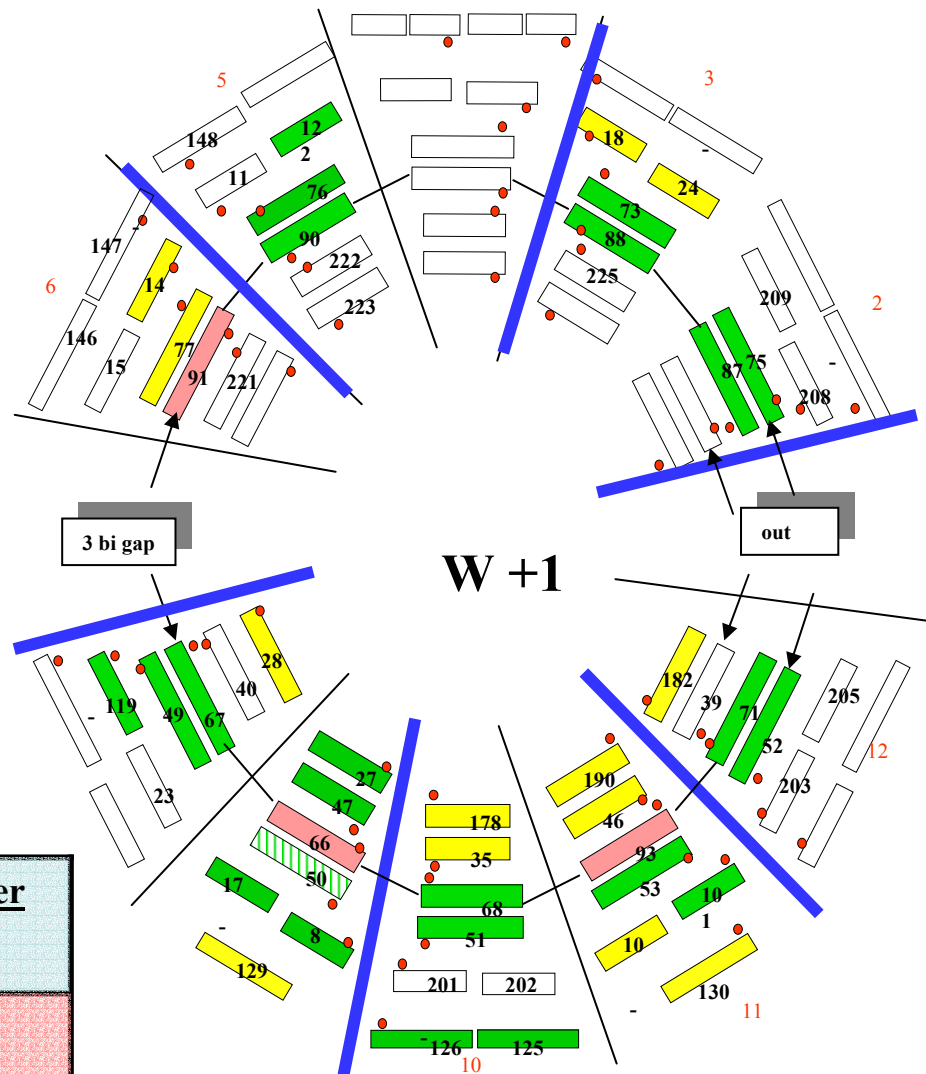
- **RB1** under test in Pavia.
- **ch 31-41** will be sent at ISR in July
- **RB4** under test in Bari. Last one under construction in GT.
- **sect 4** will be sent at ISR in July
- **RB2** construction will start, in GT, next week. They will be ready at ISR in October.
- **ch 59** under test in Bari will be sent at ISR in July

To be built	To be tested (quality cosmic test)	To be tested at ISR	<u>Ready</u>	<u>Under test</u>
11	26	36	39	5



**Sector 4 (chimney).** Construction delayed until next year: it will be ready in March, 2005.

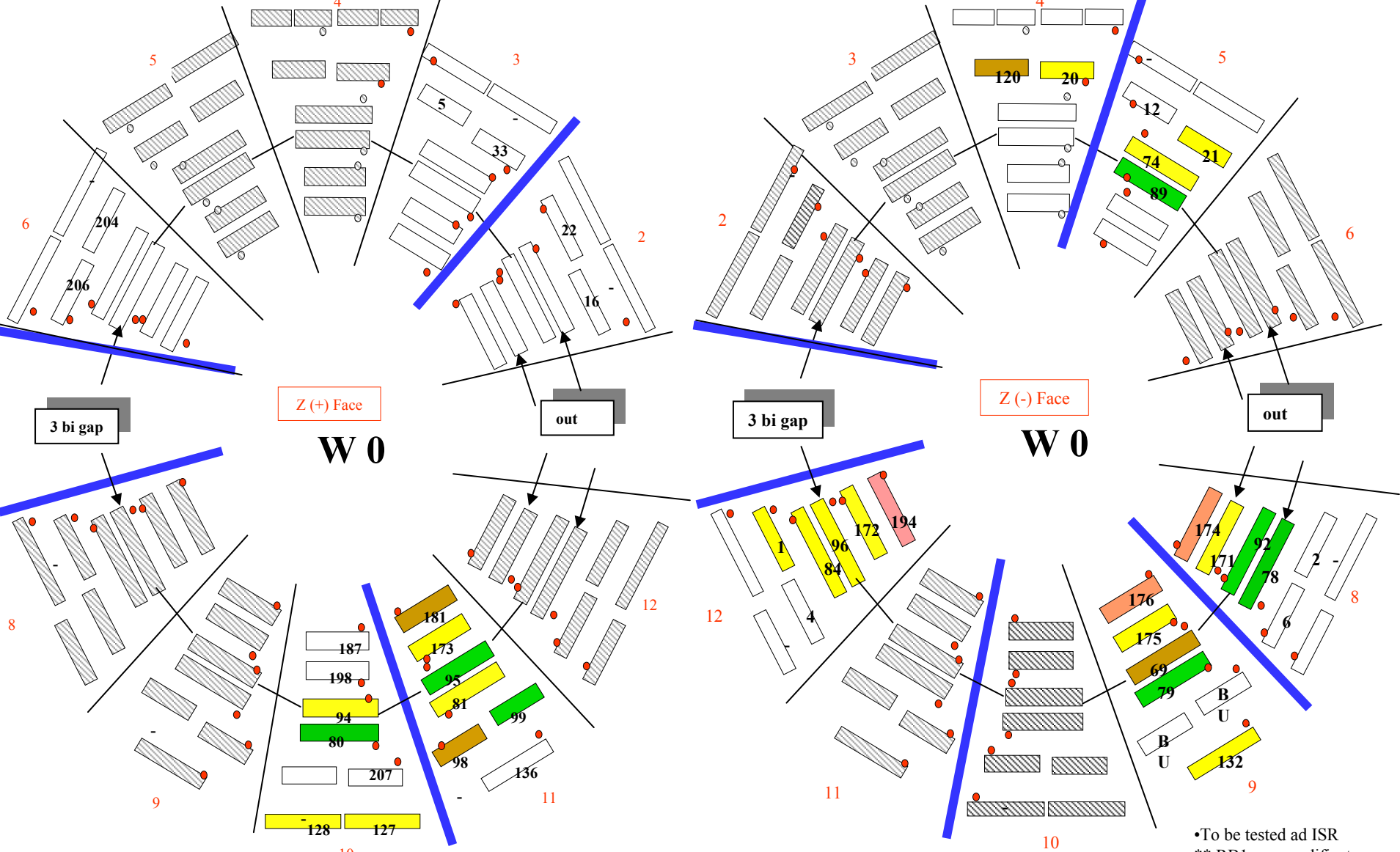
- **RB1** under construction at HT.
- **RB3** under test at Sofia. Some of them will be sent to ISR in July.



To be built	To be tested (quality cosmic test)	To be tested at ISR	<u>Ready</u>	<u>Under test</u>
<b>23</b>	<b>41</b>	<b>54</b>	<b>23</b>	<b>3</b>

- Id To be tested
- To be built
- Under test
- Tested in Italy
- Ready for installation
- Rejected at ISR
- Under observation

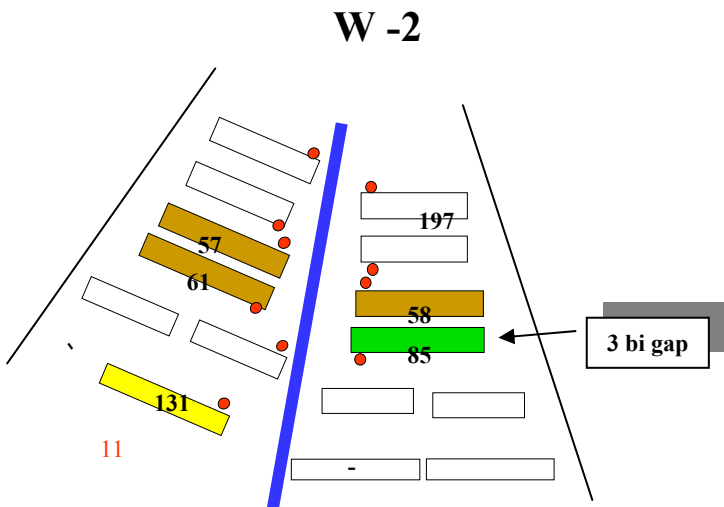
Z (+) Face



•To be tested ad ISR  
 \*\* RB1 non modificata

To be built	To be tested	To be tested at ISR	<u>Ready</u>	<u>Under test</u>
40	54	70	7	3

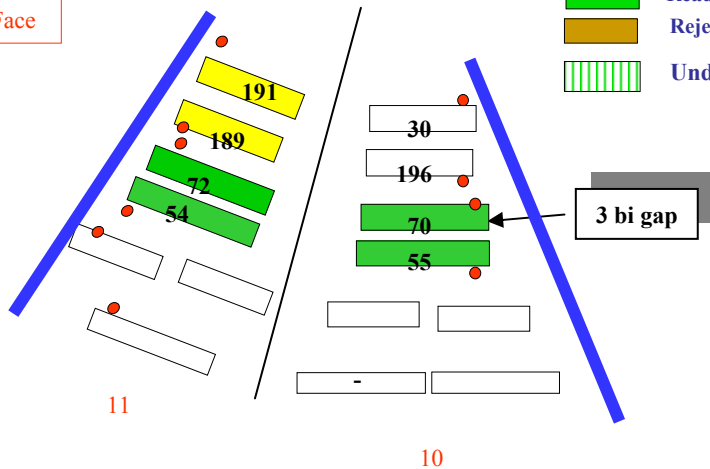
- Id To be tested
- To be built
- Under test
- Tested in Italy
- Ready for installation
- Rejected at ISR
- Under observation



To be built	To be tested (quality cosmic test)	To be tested at ISR	<u>Ready</u>	<u>Under test</u>
19	21	25	5	0

- Id To be tested
- To be built
- Under test
- Tested in Italy
- Ready for installation
- Rejected at ISR
- Under observation

Z (-) Face



## Summary on construction

- **RB1** production is started in HT.
- **RB2** production will start next week in GT
- **RB4** production will start at GT by the end of August 2004.



## Final work before coupling

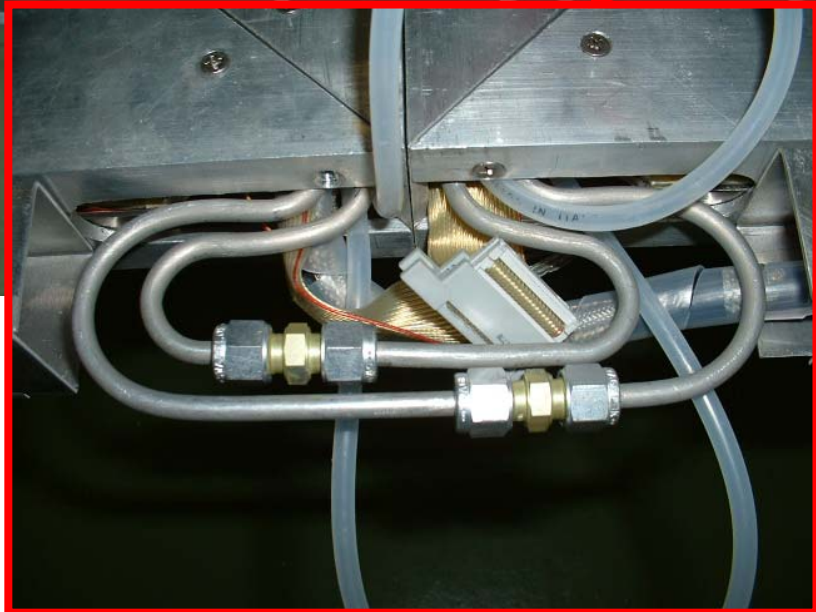
Chamber passing the tests are **ready for installation**

- Grounding straps
- Cable covers



- Cooling system test with final connectors

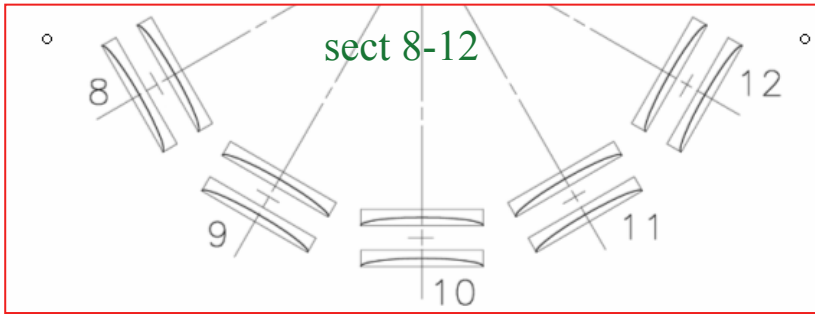
**The two RB3 will be jointed (gas & cooling pipes, LV cables) on the MB3**



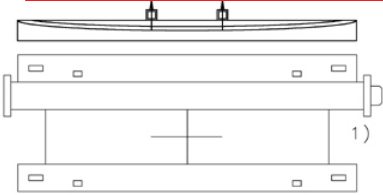
**Full RB3: jointing zone  
gas and cooling pipes**



# RPC coupling to DT and pre-load compensation

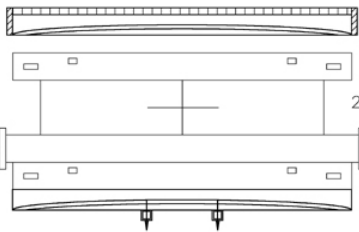


## 1st step



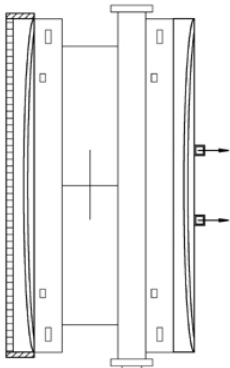
- 1) Posizionare e agganciare RB OUT su DT dopo aver preventivamente fissato le barre di trazione sulle barre precaricate.

## 2nd step



- 2) Dopo aver ruotato la stazione di 180°, posizionare e agganciare RB IN su DT. Montare pannelli di contenimento delle barre precaricate.

## 3rd step



- 3) Ruotare la stazione di 90°. Trasportare alla zona di montaggio.



**3 compensating planes needed for each RPC-DT-RPC system (MB1-MB2-MB4 stations)**

**24 compensating planes available for RB2 chambers**  
**24 planes for RB1**  
**24 planes for RB4** } **Arriving on 9 June**

## Test before installation

After the coupling need to check incidental problems:

- **Major gap problem**

gas line to check leak

- **Major electrics problem : shorts circuits etc**

Fast check of current: HV  
(2000-3000 V) & LV

- **Strip connectivity and FEBs**

288 channels frequency-meter  
realized by Naples group:  
Fast test of all the electronic  
channels of the chamber.

**1/2 hour/ chamber**

**Need to repeat the same checks at SX5 after the transport**

# Conclusions

**116 chambers are at ISR on special stoking trolleys**

**83 chambers have been tested:**

- 75 accepted**
- 1 under observation**
- 5 rejected for high current**
- 2 rejected for gas leak**

**27 chambers arriving at CERN next Wednesday**

## RPC installation deadline

- |    |   |   |                |                  |
|----|---|---|----------------|------------------|
| 1. | W+2 (bottom): RB1 + RB2 +RB3 +RB4 (9-10-11) | → | June-July 2004 | sect 8 warning   |
| 2. | W+2 (top): RB1 + RB3+ RB4 (sect.4)          | → | July 2004      | sect 3-4 warning |
| 3. | W+2 (top): RB2                              | → | October 2004   |                  |
| 4. | W+1 (bottom): RB1 + RB2+RB3+ RB4 (9-10-11)  | → | November 2004  |                  |
| 5. | W+1 (top): RB1+RB2+RB3                      | → | December 2004  |                  |
| 6. | W+1 (chimney)                               | → | March 2005     |                  |
| 7. | W0 (Z+): RB1+RB2+RB3+RB4 (10-11)            | → | March 2005     |                  |
| 8. | W0 (Z-): RB1+RB2+RB3+RB4 (9)                | → | May 2005       |                  |
| 9. | W-1 e W-2: RB1+RB2+RB3+RB4                  | → | May 2005       |                  |

**After the coupling and after the transport at SX5 it is mandatory the checks of HV, LV and strip connectivity.**