

This RPC parameter book has been updated on October 10 2002 and is based on the MDT Barrel layout Version Q. Changes with respect to layout P are for RPCs in feet sectors (both BMS and BOS). New standard RPC Units ( BMS-A and BOS-A) has been introduced. All information contained is up to date (although some are not final)

It contains 9 worksheets ("Read me first", "Parameters", "BOL", "BML", "BOS", "BMS", "BOS feet", "BMS feet", "Standard unit's details", "Special unit's details").

The "Parameters" worksheet contains constants which are used for automatic calculations of some of the values included in the "Standard unit's details" and "Special unit's details" worksheets.

The "BOL", "BML", "BOS", "BMS", "BOS feet" and "BMS feet" worksheets contain the RPC layout in the large, small and feet sectors of the ATLAS barrel spectrometer.

The layouts are presented in a "semi-graphical" format which, in great part, should be self-explanatory. However some clarifications are given in the following:

- 1) Normally one MDT chamber is covered by two (for BOLs, BOSs) or four (for BMLs, BMSs) RPC units. The two units have an overlapping region in the center of the MDT of 60 mm. Thus for an MDT with a nominal width of (i.e.) 2160 mm, the nominal active area of each RPC unit will be  $2160/2 + 30 = 1110$  mm. In some cases the MDT is covered by one (BOSs) or two (for BMLs, BMSs) RPC units. In this case the nominal active width of the RPC unit is equal to that of the MDT. These units are normally indicated by an asterisk after their name (i.e. BMS-B\*). For historical reasons also BML-A and BOS-A are of this type but do not have an asterisk in their name.
- 2) For overlapping units the active layers of the two units are at different distance from the interaction points. The ones which have the active layers closest to the interaction region are shown on a gray background in the layout. A drawing of the overlap region is shown in the "Parameter" worksheet. However the thickness of support panels reported in this drawing are not correct. The correct ones are 9 - 10 - 50 mm (for BOS, BML and BMS units) and 13,5 - 10 - 55 mm (for BOL units) for support panels n° 1 - 2 - 3 respectively.
- 3) Holes for alignment rays of the barrel spectrometer are only in special units. Some of the standard units (BOS) have holes to accommodate alignment rays of the EC spectrometer. Standard units with holes are indicated in bold characters.
- 4) Special units (for BOS feet sectors and BMS rib space) are indicated as S1, S2, S3. The detailed mechanical structure of these units is not yet defined.

The "Standard unit's details" and the "Special unit's details" worksheets contain detailed information on the various units which appear in the layout worksheets. Again, many information are self-explanatory but some comments are useful:

- 1) Each detector layer is equipped with 4 readout panels, two measuring eta and two measuring phi. Besides signal strips, each panel has two guard strips connected to ground at their extremities running parallel to the signal strips. The width of these are reported in the worksheet.
- 2) Position of the RPC units in the ATLAS coordinate system are not indicated since the exact position will be determined after the final designs of the common supports will be finalized. The position of MDT reported in the MDT chambers parameter book can be used as a reference.

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| RPC multi-layer structure | Weight (kg/m <sup>2</sup> ) |
|---------------------------|-----------------------------|
| Support panel # 1         | 2,37                        |
| Readout panel             | 0,76                        |
| Gas volume                | 5,16                        |
| Pet layer                 | 0,27                        |
| Readout panel             | 0,76                        |
| Support panel # 2         | 1,35                        |
| Readout panel             | 0,76                        |
| Pet layer                 | 0,27                        |
| Gas volume                | 5,16                        |
| Readout panel             | 0,76                        |
| Support panel # 3         | 4,09                        |
| <b>Total</b>              | <b>21,72</b>                |

| Lateral profiles | Weight (kg/m) |
|------------------|---------------|
| A-type           | 0,30          |
| B-type           | 1,00          |
| C-type           | 1,32          |
| <b>Total</b>     | <b>2,62</b>   |

| End plates                               | Weight (kg/m) |
|--|---------------|
| D-type                                   | 2,00          |
| Interface to common support (BOS)        | 2,70          |
| Interface to common support (BOL-BML-BN) | 3,00          |

| Electronics     | Weight (kg/m) |
|-----------------|---------------|
| Front End Board | 0,09          |
| Back End Board  | 0,08          |
| <b>Total</b>    | <b>0,17</b>   |

| Support panel # 1 | Weight (kg/m <sup>2</sup> ) |
|-------------------|-----------------------------|
| Aluminum (0.3 mm) | 0,81                        |
| Glue              | 0,40                        |
| Paper honeycomb   | 0,35                        |
| Aluminum (0.3 mm) | 0,81                        |
| <b>Total</b>      | <b>2,37</b>                 |

| Support panel # 2 | Weight (kg/m <sup>2</sup> ) |
|-------------------|-----------------------------|
| Aluminum (0.1 mm) | 0,27                        |
| Glue              | 0,40                        |
| Paper honeycomb   | 0,41                        |
| Aluminum (0.1 mm) | 0,27                        |
| <b>Total</b>      | <b>1,35</b>                 |

| Support panel # 3 | Weight (kg/m <sup>2</sup> ) |
|-------------------|-----------------------------|
| Aluminum (0.3 mm) | 0,81                        |
| Glue              | 0,40                        |
| Paper honeycomb   | 2,07                        |
| Aluminum (0.3 mm) | 0,81                        |
| <b>Total</b>      | <b>4,09</b>                 |

| Readout panel     | Weight (kg/m <sup>2</sup> ) |
|-------------------|-----------------------------|
| Copper (0.017 mm) | 0,15                        |
| PET (0,19 mm)     | 0,27                        |
| Foam (3 mm)       | 0,11                        |
| PET (0,06 mm)     | 0,08                        |
| Copper (0.017 mm) | 0,15                        |
| <b>Total</b>      | <b>0,76</b>                 |

| Gas volume        | Weight (kg/m <sup>2</sup> ) |
|-------------------|-----------------------------|
| PET (0,19 mm)     | 0,06                        |
| Bakelite (1,8 mm) | 2,52                        |
| Gas (2 mm)        | 0,01                        |
| Bakelite (1,8 mm) | 2,52                        |
| PET (0,19 mm)     | 0,06                        |
| Spacers (100)     | 0,50                        |
| <b>Total</b>      | <b>5,16</b>                 |

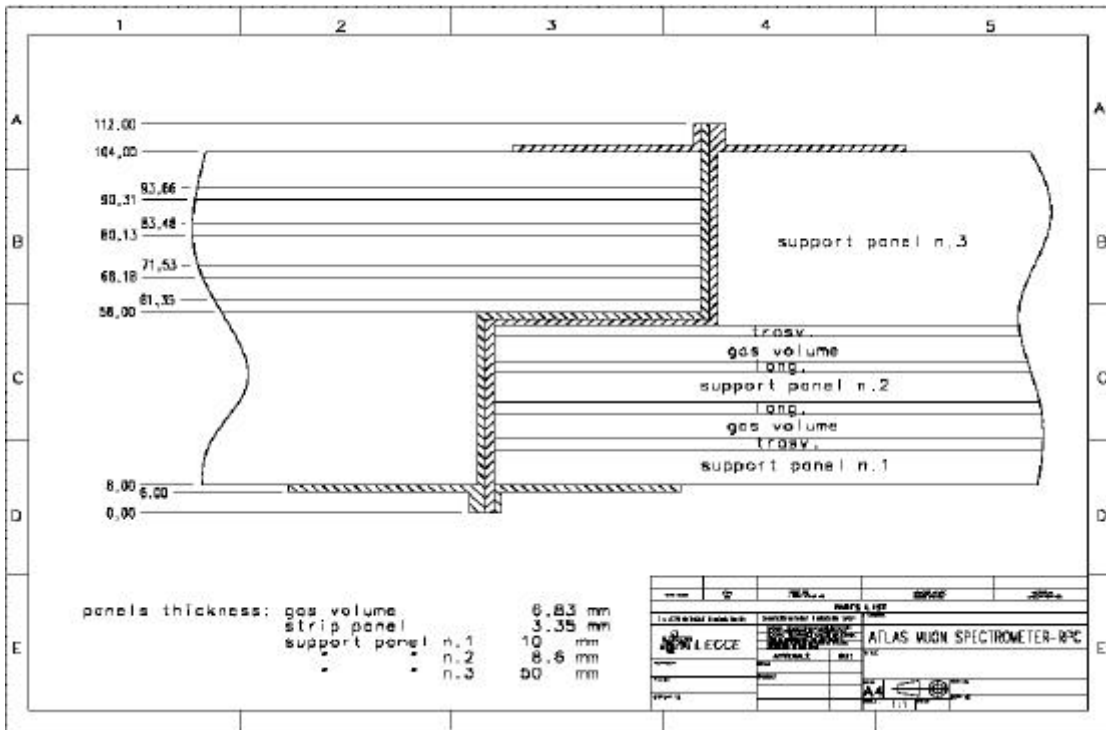
| Gas volume frame | Weight (kg/m) |
|------------------|---------------|
| Polycarbonate    | 0,01          |
| <b>Total</b>     | <b>0,01</b>   |

| Cables               | Weight (kg/FE board) |
|----------------------|----------------------|
| Shielded cable (1 m) | 0,12                 |
| <b>Total</b>         | <b>0,12</b>          |

| Services                     | Weight (kg/module) |
|------------------------------|--------------------|
| Faraday Cage                 | 0,400              |
| Gas tubing                   | 0,124              |
| High Voltage Cable           | 0,040              |
| Test Cable                   | 0,016              |
| Test Connector               | 0,014              |
| Low Voltage Connector+cables | 0,080              |
| Carter+HV Connector          | 0,180              |
| <b>Total</b>                 | <b>0,85</b>        |

**RPC Constants**

|   |       |
|---|-------|
| Aluminium density (kg/dm <sup>3</sup> )                     | 2,7   |
| Copper density (kg/dm <sup>3</sup> )                        | 8,96  |
| Bakelite density (kg/dm <sup>3</sup> )                      | 1,4   |
| Foam density [styreen] (kg/dm <sup>3</sup> )                | 0,035 |
| Paper honeycomb (kg/dm <sup>3</sup> )                       | 0,042 |
| Polyetileneterephtalate (PET) density (kg/dm <sup>3</sup> ) | 1,4   |
| Spacer disk weight (kg)                                     | 0,005 |
| Gas density (kg/dm <sup>3</sup> )                           | 0,006 |
| G10 gensity (kg/dm <sup>3</sup> )                           | 2     |
| Polycarbonate density (kg/dm <sup>3</sup> )                 | 1     |
| Shielded cable linear density (kg/m)                        | 0,115 |









| SIDE A    |       |       |        |     |        |       |       |       |     |       |       |       | SIDE C |       |       |       |       |       |       |       |       |       |       |        |       |       |
|-----------|-------|-------|--------|-----|--------|-------|-------|-------|-----|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| MDT ch    | BMS.6 |       | BMS.5  | Rib | BMS.4  |       | BMS.3 |       | Rib | BMS.2 |       | BMS.1 | BMS.1  |       | BMS.2 |       | Rib   | BMS.3 |       | BMS.4 |       | Rib   | BMS.5 |        | BMS.6 |       |
| Sector 2  | BMS-E | BMS-E | BMS-C* | S2  | BMS-E  | BMS-E | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S2    | BMS-C* | BMS-E | BMS-E |
|           | 1440  |       | 960    |     | 1440   |       | 1440  |       |     | 1440  |       | 1680  |        | 1680  |       | 1440  |       |       | 1440  |       | 1440  |       |       | 960    |       | 1440  |
|           | BMS-E | BMS-E | BMS-C* | S3  | BMS-B* |       | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S3    | BMS-C* | BMS-E | BMS-E |
| Sector 4  | BMS-E | BMS-E | BMS-C* | S2  | BMS-E  | BMS-E | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S2    | BMS-C* | BMS-E | BMS-E |
|           | 1440  |       | 960    |     | 1440   |       | 1440  |       |     | 1440  |       | 1680  |        | 1680  |       | 1440  |       |       | 1440  |       | 1440  |       |       | 960    |       | 1440  |
|           | BMS-E | BMS-E | BMS-C* | S3  | BMS-B* |       | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S3    | BMS-C* | BMS-E | BMS-E |
| Sector 6  | BMS-E | BMS-E | BMS-C* | S2  | BMS-E  | BMS-E | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S2    | BMS-C* | BMS-E | BMS-E |
|           | 1440  |       | 960    |     | 1440   |       | 1440  |       |     | 1440  |       | 1680  |        | 1680  |       | 1440  |       |       | 1440  |       | 1440  |       |       | 960    |       | 1440  |
|           | BMS-E | BMS-E | BMS-C* | S3  | BMS-B* |       | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S3    | BMS-C* | BMS-E | BMS-E |
| Sector 8  | BMS-E | BMS-E | BMS-C* | S2  | BMS-E  | BMS-E | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S2    | BMS-C* | BMS-E | BMS-E |
|           | 1440  |       | 960    |     | 1440   |       | 1440  |       |     | 1440  |       | 1680  |        | 1680  |       | 1440  |       |       | 1440  |       | 1440  |       |       | 960    |       | 1440  |
|           | BMS-E | BMS-E | BMS-C* | S3  | BMS-B* |       | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S3    | BMS-C* | BMS-E | BMS-E |
| Sector 10 | BMS-E | BMS-E | BMS-C* | S2  | BMS-E  | BMS-E | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S2    | BMS-C* | BMS-E | BMS-E |
|           | 1440  |       | 960    |     | 1440   |       | 1440  |       |     | 1440  |       | 1680  |        | 1680  |       | 1440  |       |       | 1440  |       | 1440  |       |       | 960    |       | 1440  |
|           | BMS-E | BMS-E | BMS-C* | S3  | BMS-B* |       | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S3    | BMS-C* | BMS-E | BMS-E |
| Sector 16 | BMS-E | BMS-E | BMS-C* | S2  | BMS-E  | BMS-E | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S2    | BMS-C* | BMS-E | BMS-E |
|           | 1440  |       | 960    |     | 1440   |       | 1440  |       |     | 1440  |       | 1680  |        | 1680  |       | 1440  |       |       | 1440  |       | 1440  |       |       | 960    |       | 1440  |
|           | BMS-E | BMS-E | BMS-C* | S3  | BMS-B* |       | BMS-E | BMS-E | S2  | BMS-E | BMS-E | BMS-D | BMS-D  | BMS-D | BMS-D | BMS-E | BMS-E | S2    | BMS-E | BMS-E | BMS-E | BMS-E | S3    | BMS-C* | BMS-E | BMS-E |

|       |    |        |    |        |    |       |    |       |    |       |    |       |    |       |    |       |    |        |    |        |    |       |    |
|-------|----|--------|----|--------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|--------|----|--------|----|-------|----|
| BMS-E | 18 | BMS-C* | 12 | BMS-E  | 12 | BMS-E | 24 | BMS-E | 24 | BMS-D | 22 | BMS-D | 22 | BMS-E | 24 | BMS-E | 24 | BMS-E  | 12 | BMS-C* | 12 | BMS-E | 18 |
| BMS-E | 6  |        |    | BMS-B* | 6  |       |    |       |    | BMS-D | 2  | BMS-D | 2  |       |    |       |    | BMS-B* | 6  |        |    | BMS-E | 6  |

| Totali Unità BMS  |     |
|-------------------|-----|
| BMS-D has cutout  |     |
| BMS-E has 2 holes |     |
| BMS-B*            | 12  |
| BMS-C*            | 24  |
| BMS-D             | 44  |
| BMS-D             | 4   |
| BMS-E             | 156 |
| BMS-E             | 12  |
|                   | 252 |

| Totali Unità speciali |    |
|-----------------------|----|
| All have 1 hole       |    |
| S2                    | 72 |
| S3                    | 24 |



| SIDE A    |              |        |                |             |                |             |                |             |               | SIDE C      |                |             |                |             |                |        |              |
|-----------|--------------|--------|----------------|-------------|----------------|-------------|----------------|-------------|---------------|-------------|----------------|-------------|----------------|-------------|----------------|--------|--------------|
| MDT ch.   | BOG.8A       | BOF.7A | Foot<br>BOG.6A | BOF.5A      | Foot<br>BOG.4A | BOF.3A      | Foot<br>BOG.2A | BOF.1       | Foot<br>BOG.0 | BOF.1C      | Foot<br>BOG.2C | BOF.3C      | Foot<br>BOG.4C | BOF.5C      | Foot<br>BOG.6C | BOF.7C | BOG.8C       |
| Sector 12 | 1200         | 1200   |                | 1440        |                | 1920        |                | 2160        |               | 2160        |                | 1920        |                | 1440        |                | 1200   | 1200         |
|           | <b>BOS-A</b> | BOS-A  | S1             | BOS-E BOS-E | S1             | BOS-C BOS-C | S1             | BOS-B BOS-B | S1            | BOS-B BOS-B | S1             | BOS-C BOS-C | S1             | BOS-E BOS-E | S1             | BOS-A  | <b>BOS-A</b> |
| Sector 14 | 1200         | 1200   |                | 1440        |                | 1920        |                | 2160        |               | 2160        |                | 1920        |                | 1440        |                | 1200   | 1200         |
|           | <b>BOS-A</b> | BOS-A  | S1             | BOS-E BOS-E | S1             | BOS-C BOS-C | S1             | BOS-B BOS-B | S1            | BOS-B BOS-B | S1             | BOS-C BOS-C | S1             | BOS-E BOS-E | S1             | BOS-A  | <b>BOS-A</b> |

**BOS-A** 2   **BOS-A** 2                      BOS-E 4                      **BOS-C** 4                      BOS-B 4                      BOS-B 4                      **BOS-C** 4                      BOS-E 4                      **BOS-A** 2   **BOS-A** 2

|                         |           |
|-------------------------|-----------|
| Totali Unità BOS        |           |
| <b>BOS-A has 1 hole</b> |           |
| <b>BOS-A</b>            | 4         |
| BOS-A                   | 4         |
| BOS-B                   | 8         |
| BOS-C                   | 8         |
| BOS-E                   | 8         |
|                         | <b>32</b> |

|                       |    |
|-----------------------|----|
| Totali Unità speciali |    |
| <b>S1</b>             | 14 |

| SIDE A    |      |       |      |                                |      |  |      |  |      | SIDE C                                 |      |  |      |                                |      |       |      |  |  |
|-----------|------|-------|------|--------------------------------|------|--|------|--|------|--|------|--|------|--------------------------------|------|-------|------|--|--|
| MDT ch.   | Foot |       | Foot | BMF.3                          | Foot | BMF.2                                  | Foot | BMF.1                                  | Foot | BMF.1                                  | Foot | BMF.2                                  | Foot | BMF.3                          | Foot |       | Foot |  |  |
| Sector 12 |      | Empty |      | BMS-E   BMS-E<br>1440<br>BMS-A |      | BMS-C   BMS-C<br>1920<br>BMS-D   BMS-D |      | BMS-B   BMS-B<br>2160<br>BMS-C   BMS-C |      | BMS-B   BMS-B<br>2160<br>BMS-C   BMS-C |      | BMS-C   BMS-C<br>1920<br>BMS-D   BMS-D |      | BMS-E   BMS-E<br>1440<br>BMS-A |      | Empty |      |  |  |
| Sector 14 |      | Empty |      | BMS-E   BMS-E<br>1440<br>BMS-A |      | BMS-C   BMS-C<br>1920<br>BMS-D   BMS-D |      | BMS-B   BMS-B<br>2160<br>BMS-C   BMS-C |      | BMS-B   BMS-B<br>2160<br>BMS-C   BMS-C |      | BMS-C   BMS-C<br>1920<br>BMS-D   BMS-D |      | BMS-E   BMS-E<br>1440<br>BMS-A |      | Empty |      |  |  |

BMS-A 2      BMS-C 4      BMS-B 4      BMS-B 4      BMS-C 4      BMS-A 2  
 BMS-E 4      BMS-D 4      BMS-C 4      BMS-C 4      BMS-D 4      BMS-E 4

| Totali Unità BMS |    |
|------------------|----|
| BMS-A            | 4  |
| BMS-B            | 8  |
| BMS-C            | 16 |
| BMS-D            | 8  |
| BMS-E            | 8  |
|                  | 44 |

## STANDARD UNITS

|  | BOL-B                 | BOL-D        | BOL-E        | BML-A                 | BML-D        | BML-E        | BML-G*      | BOS-A                 | BOS-B        | BOS-C        | BOS-D        | BOS-E        | BMS-A                 | BMS-B        | BMS-B*       | BMS-C        | BMS-C*       | BMS-D        | BMS-E       | Total       |
|--|-----------------------|--------------|--------------|-----------------------|--------------|--------------|-------------|-----------------------|--------------|--------------|--------------|--------------|-----------------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|
| # of units in the detector                   | 97                    | 73           | 22           | 70                    | 148          | 80           | 16          | 8                     | 136          | 8            | 12           | 12           | 4                     | 8            | 12           | 16           | 24           | 56           | 176         | 978         |
| # of detector layers                         | 2                     | 2            | 2            | 2                     | 2            | 2            | 2           | 2                     | 2            | 2            | 2            | 2            | 2                     | 2            | 2            | 2            | 2            | 2            | 2           | 2           |
| Length in z (mm)                             | 1110                  | 870          | 750          | 1200                  | 870          | 750          | 480         | 1200                  | 1110         | 990          | 870          | 750          | 1200                  | 1110         | 1080         | 990          | 960          | 870          | 750         | 750         |
| Width in phi (mm)                            | 5090                  | 5090         | 5090         | 3680                  | 3680         | 3680         | 3280        | 3900                  | 3900         | 3900         | 3900         | 3900         | 3200                  | 3200         | 3200         | 3200         | 3200         | 3200         | 3200        | 3200        |
| Active width (mm)                            | 4850                  | 4850         | 4850         | 3440                  | 3440         | 3440         | 3040        | 3660                  | 3660         | 3660         | 3660         | 3660         | 2960                  | 2960         | 2960         | 2960         | 2960         | 2960         | 2960        | 2960        |
| Longitudinal (eta) strip pitch (mm)          | 34,0                  | 35,3         | 30,3         | 29,4                  | 26,5         | 30,3         | 28,5        | 29,4                  | 34           | 30,2         | 26,5         | 30,3         | 29,4                  | 27,2         | 26,4         | 30,2         | 29,3         | 26,5         | 30,3        | 30,3        |
| Ground guard on eta strips (mm)              | 8,0                   | 8,4          | 8,4          | 9                     | 8            | 8,4          | 9           | 9                     | 8            | 8,8          | 8            | 8,4          | 9                     | 8            | 9            | 8,8          | 8,2          | 8            | 8,4         | 8,4         |
| Transversal (phi) strip pitch (mm)           | 30,1                  | 30,1         | 30,1         | 26,6                  | 26,6         | 26,6         | 26,8        | 28,3                  | 28,3         | 28,3         | 28,3         | 28,3         | 30,5                  | 30,5         | 30,5         | 30,5         | 30,5         | 30,5         | 30,5        | 30,5        |
| Ground guard on phi strips (mm)              | 8,5                   | 8,5          | 8,5          | 8,8                   | 8,8          | 8,8          | 9,6         | 9,4                   | 9,4          | 9,4          | 9,4          | 9,4          | 8                     | 8            | 8            | 8            | 8            | 8            | 8           | 8           |
| # of longitudinal (eta) strips/layer         | 64                    | 48           | 48           | 80                    | 64           | 48           | 32          | 80                    | 64           | 64           | 64           | 48           | 80                    | 80           | 80           | 64           | 64           | 64           | 48          | 48          |
| # of transversal (phi) strips/layer          | 160                   | 160          | 160          | 128                   | 128          | 128          | 112         | 128                   | 128          | 128          | 128          | 128          | 96                    | 96           | 96           | 96           | 96           | 96           | 96          | 96          |
| # of longitudinal (eta) strips/unit          | 128                   | 96           | 96           | 160                   | 128          | 96           | 64          | 160                   | 128          | 128          | 128          | 96           | 160                   | 160          | 160          | 128          | 128          | 128          | 96          | 96          |
| # of transversal (phi) strips/unit           | 320                   | 320          | 320          | 256                   | 256          | 256          | 224         | 256                   | 256          | 256          | 256          | 256          | 192                   | 192          | 192          | 192          | 192          | 192          | 192         | 192         |
| Area/unit (m2)                               | 5,4                   | 4,2          | 3,6          | 4,1                   | 3,0          | 2,6          | 1,5         | 4,4                   | 4,1          | 3,6          | 3,2          | 2,7          | 3,6                   | 3,3          | 3,2          | 2,9          | 2,8          | 2,6          | 2,2         | 2,2         |
| Gas volume/unit (lt)                         | 21,5                  | 16,9         | 14,6         | 16,5                  | 12,0         | 10,3         | 5,8         | 17,6                  | 16,3         | 14,5         | 12,7         | 11,0         | 14,2                  | 13,1         | 12,8         | 11,7         | 11,4         | 10,3         | 8,9         | 8,9         |
| Weight of RPC multilayer structure/unit (kg) | 116,9                 | 91,6         | 79,0         | 89,7                  | 65,0         | 56,0         | 31,7        | 95,4                  | 88,2         | 78,7         | 69,2         | 59,6         | 77,1                  | 71,4         | 69,4         | 63,6         | 61,7         | 55,9         | 48,2        | 48,2        |
| Weight of gas volumes frame/unit (kg)        | 0,396                 | 0,369        | 0,356        | 0,327                 | 0,290        | 0,277        | 0,224       | 0,339                 | 0,329        | 0,316        | 0,302        | 0,289        | 0,300                 | 0,290        | 0,287        | 0,277        | 0,273        | 0,263        | 0,250       | 0,250       |
| Weight of lateral profiles/unit (kg)         | 26,7                  | 26,7         | 26,7         | 19,3                  | 19,3         | 19,3         | 17,2        | 20,5                  | 20,5         | 20,5         | 20,5         | 20,5         | 16,8                  | 16,8         | 16,8         | 16,8         | 16,8         | 16,8         | 16,8        | 16,8        |
| Weight of end plates/unit (kg)               | 4,4                   | 3,5          | 3,0          | 4,8                   | 3,5          | 3,0          | 1,9         | 4,8                   | 4,4          | 4,0          | 3,5          | 3,0          | 4,8                   | 4,4          | 4,3          | 4,0          | 3,8          | 3,5          | 3,0         | 3,0         |
| Weight of electronic boards/unit (kg)        | 2,3                   | 2,2          | 2,1          | 1,9                   | 1,7          | 1,6          | 1,3         | 2,0                   | 1,9          | 1,9          | 1,8          | 1,7          | 1,8                   | 1,7          | 1,7          | 1,6          | 1,6          | 1,6          | 1,5         | 1,5         |
| Weight of interface to common support (kg)   | 7,0                   | 5,5          | 4,7          | 7,5                   | 5,4          | 4,7          | 3,0         | 7,5                   | 6,9          | 6,2          | 5,4          | 4,7          | 7,5                   | 6,9          | 6,7          | 6,2          | 6,0          | 5,4          | 4,7         | 4,7         |
| Weight of common support                     | In MDT parameter book |              |              | In MDT parameter book |              |              |             | In MDT parameter book |              |              |              |              | In MDT parameter book |              |              |              |              |              |             |             |
| Weight of trigger boxes electronics          | 12                    | 12           | 12           | 12                    | 12           | 12           | 12          | 12                    | 12           | 12           | 12           | 12           | 12                    | 12           | 12           | 12           | 12           | 12           | 12          | 12          |
| Weight of cables                             | 15,85                 | 12,41        | 11,85        | 13,98                 | 11,08        | 8,94         | 5,53        | 14,49                 | 12,36        | 11,92        | 11,48        | 9,25         | 11,50                 | 11,25        | 11,17        | 9,45         | 9,37         | 9,12         | 7,31        | 7,31        |
| Weight of services                           | 0,85                  | 0,85         | 0,85         | 0,85                  | 0,85         | 0,85         | 0,85        | 0,85                  | 0,85         | 0,85         | 0,85         | 0,85         | 0,85                  | 0,85         | 0,85         | 0,85         | 0,85         | 0,85         | 0,85        | 0,85        |
| <b>Total weight/unit (kg)</b>                | <b>186,4</b>          | <b>155,1</b> | <b>140,5</b> | <b>150,3</b>          | <b>119,1</b> | <b>106,7</b> | <b>73,7</b> | <b>157,8</b>          | <b>147,5</b> | <b>136,2</b> | <b>124,9</b> | <b>111,8</b> | <b>132,6</b>          | <b>125,6</b> | <b>123,3</b> | <b>114,8</b> | <b>112,4</b> | <b>105,4</b> | <b>94,6</b> | <b>94,6</b> |
| Total area (m2)                              | 522,2                 | 308,0        | 80,0         | 289,0                 | 442,9        | 206,4        | 23,3        | 35,1                  | 552,5        | 29,0         | 38,2         | 32,9         | 14,2                  | 26,3         | 38,4         | 46,9         | 68,2         | 144,2        | 390,7       | 3289        |
| Total gas volume (m3)                        | 2,1                   | 1,2          | 0,3          | 1,2                   | 1,8          | 0,8          | 0,1         | 0,1                   | 2,2          | 0,1          | 0,2          | 0,1          | 0,1                   | 0,1          | 0,2          | 0,2          | 0,3          | 0,6          | 1,6         | 13,2        |
| Total weight (kg)                            | 18085                 | 11320        | 3092         | 10523                 | 17632        | 8537         | 1180        | 1262                  | 20065        | 1090         | 1499         | 1342         | 531                   | 1005         | 1479         | 1836         | 2698         | 5903         | 16643       | 125723      |
| Front End boards/unit                        | 56                    | 52           | 52           | 52                    | 48           | 44           | 36          | 52                    | 48           | 48           | 48           | 44           | 44                    | 44           | 44           | 40           | 40           | 40           | 36          | 36          |
| Total # of Front End boards                  | 5432                  | 3796         | 1144         | 3640                  | 7104         | 3520         | 576         | 416                   | 6528         | 384          | 576          | 528          | 176                   | 352          | 528          | 640          | 960          | 2240         | 6336        | 44876       |

## SPECIAL UNITS

|  | S1                    | S2          | S3          | Total |
|--|-----------------------|-------------|-------------|-------|
| # of units in the detector                   | 14                    | 72          | 24          | 110   |
| # of detector layers                         | 2                     | 2           | 2           |       |
| Length in z (mm)                             | 840                   | 320         | 660         |       |
| Width in phi (mm)                            | 3900                  | 1180        | 1180        |       |
| Active width (mm)                            | 3660                  | 1060        | 1060        |       |
| Longitudinal (eta) strip pitch (mm)          | 26,5                  | 37,0        | 26,5        |       |
| Ground guard on eta strips (mm)              |                       |             |             |       |
| Transversal (phi) strip pitch (mm)           | 28,3                  | 32,6        | 32,6        |       |
| Ground guard on phi strips (mm)              |                       |             |             |       |
| # of longitudinal (eta) strips/layer         | 64                    | 8           | 24          |       |
| # of transversal (phi) strips/layer          | 128                   | 32          | 32          |       |
| # of longitudinal (eta) strips/unit          | 128                   | 16          | 48          |       |
| # of transversal (phi) strips/unit           | 256                   | 64          | 64          |       |
| Area/unit (m2)                               | 3,1                   | 0,3         | 0,7         |       |
| Gas volume/unit (lt)                         | 12,3                  | 1,4         | 2,8         |       |
| Weight of RPC multilayer structure/unit (kg) | 66,8                  | 7,4         | 15,2        |       |
| Weight gas volumes frame/unit (kg)           | 0,299                 | 0,095       | 0,133       |       |
| Weight of lateral profiles/unit (kg)         | 20,5                  | 6,2         | 6,2         |       |
| Weight of end plates/unit (kg)               | 3,4                   | 1,3         | 2,6         |       |
| Weight of electronic boards/unit (kg)        | 1,8                   | 0,6         | 0,8         |       |
| Weight of interface to common support (kg)   | 4,5                   | 1,9         | 4,0         |       |
| Weight of common support                     | In MDT parameter book |             |             |       |
| Weight of trigger boxes electronics          | 0,0                   | 0,0         | 0,0         |       |
| Weight of cables                             | 11,4                  | 0,84        | 1,7         |       |
| Weight of services                           | 0,85                  | 0,85        | 0,85        |       |
| <b>Total weight/unit (kg)</b>                | <b>109,4</b>          | <b>19,1</b> | <b>31,5</b> |       |
| Total area (m2)                              | 43,0                  | 24,4        | 16,8        | 84    |
| Total gas volume (m3)                        | 0,2                   | 0,1         | 0,1         | 0,3   |
| Total weight (kg)                            | 1532                  | 1376        | 755         | 3662  |
| Front End boards/unit                        | 48                    | 10          | 14          |       |
| Total # of Front End boards                  | 672                   | 720         | 336         | 1728  |

Values for special Units are indicative since the design of these Unit is not yet finalized. A new type of standard RPC unit (BOS-D\*) could be used as S1 special Unit