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# DSA101 and DSA102 Bullet Gage Transducer

During the pretesting of DSA101 and DSA102 I found that the serial numbers of active and compensating bullet gages were from different batches. That is to say that the set of four bullets and their two compensating gages were not calibrated together at low temperatures. I will list all the bullet gages that were used on the two SSC built short R&D magnets .

| | DSA101 Bullet Gages | Gage Location | DSA102 Bullet Gages |
|---|---|---|---|
| 1A | SBB-FBA173A1 | Bullet Quadrant 1 Active | SBB-FBA1_5A1 |
| 1B | SBB-FBA173B1 | Bullet Quadrant 1 Active | SBB-FBA1¯5B1 |
| 2A | SBB-FBA2_5A2 | Bullet Quadrant 2 Active | SBB-FBA17_2A |
| 2B | SBB-FBA2¯5B2 | Bullet Quadrant 2 Active | SBB-FBA17¯2B |
| CT | SBC-FBC17_2 | Bullet Upper Comp. | SBC-FBC70¯1 |
| 3A | SBB-FBA1-2A3 | Bullet Quadrant 3 Active | SBB-FBA17_1A |
| 3B | SBB-FBA1-2B3 | Bullet Quadrant 3 Active | SBB-FBA17¯1B |
| 4A | SBB-FBA1-4A4 | Bullet Quadrant 4 Active | SBB-FBA17¯4A |
| 4B | SBB-FBA1_4B4 | Bullet Quadrant 4 Active | SBB-FBA17¯4B |
| CB | SBC-FBC2¯2 | Bullet Lower Comp. | SBC-FBC57¯2 |

The cold ROs of compensating gages (CB and CT), provided to Lab2, on both magnets were incorrect and is evident by the bullet gage data at low temperatures. It is important to have all active and compensating bullet gages, used on a magnet, to be cold calibrated together. The active bullet gages are calibrated under varying loads and the compensating gages are calibrated without any kind of loading.

To correct the active gage readings for the effect of temperature changes and magnetic field effect two pairs of active bullet gages are provided with a compensating gage of the same material as the active gages. The compensating gages are cold calibrated with the active gages that they are to be paired with. The compensating gages should be mounted on the magnet end plate such that they are stress free and located in positions which have the same magnetic field and temperature variation as the corresponding active gages.

The loading screws are torqued to produce a load, typically of about 250-350 lbs. per bullet or ~1000 lbs, on the magnet end while it is at room temperature. The end force changes, as the magnet is cooled down to operating temperature, because of the difference in the thermal contraction of the coil assembly and the yoke. This change also depends on how the collared coil is retained in the yoke and is also related to the design of the end plate. The ends of the SSC dipoles experience a large axial Lorentz force at 6.6 Tesla. So it is important to know how much of this is transmitted to the support plate at the end of the coil.

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