

# **Admixture evaluation**

## **- Mumbai region**

# Technical Requirements

- Type of admixture
- Minimum water reduction required (18% or greater in our case)
- Retention time for mixes etc. (Taking into account worst case scenarios)
- Details of mix design for each area

# Aim

Conduct concrete trials on two cements (OPC & PPC) with one lower grade (major concrete grade in the area, M30) & one higher grade (M40 & above, M50) & to record the following data:

- Dosage of admixture
- Slump (Initial) & Slump retention  
(For the retention desired in the area)
- Air content
- Compressive strength  
(7 & 28 days)

# Superplasticizers studied

| Superplasticizer Brand | Superplasticizer         | Type of SP (As per ASTM) |
|------------------------|--------------------------|--------------------------|
| 1                      | LD RB112 [LG]            | Type G                   |
|                        | LD RB111 [HG]            | Type G                   |
| 2                      | CF 125 [LG]              | Type G                   |
|                        | CF 165 [HG]              | Type G                   |
| 3                      | SUPAPLAST-PC(RMC) [LG]   | Type G                   |
|                        | SUPAPLAST-PC(S) [HG]     | Type G                   |
| 4                      | SIKAMENT 581 acc [LG]    | Type G                   |
|                        | SIKAMENT HE 510 acc [HG] | Type G                   |
| 5                      | CONPLAST SP-440 [LG]     | Type G                   |
|                        | CONPLAST SP-500 [HG]     | Type G                   |

# Concrete mixtures studied for evaluation

|             | <b>OPC<br/>(30 MPa)</b> | <b>OPC<br/>(50 MPa)</b> | <b>PPC<br/>(30 MPa)</b> | <b>PPC<br/>(50 MPa)</b> |
|-------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Cement, kg  | 380                     | 480                     | 380                     | 520                     |
| Water, kg   | 160                     | 160                     | 160                     | 160                     |
| 20 mm, kg   | 433                     | 545                     | 428                     | 525                     |
| 10 mm, kg   | 473                     | 451                     | 467                     | 435                     |
| N. Sand, kg | 668                     | 551                     | 660                     | 531                     |
| C. Sand, kg | 330                     | 278                     | 326                     | 268                     |

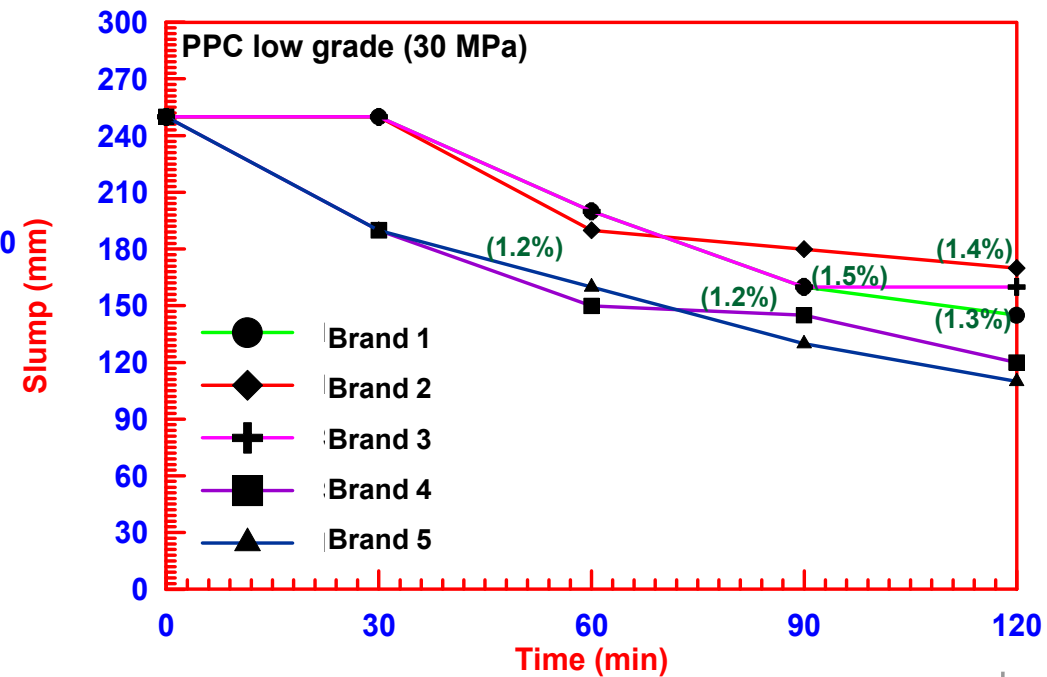
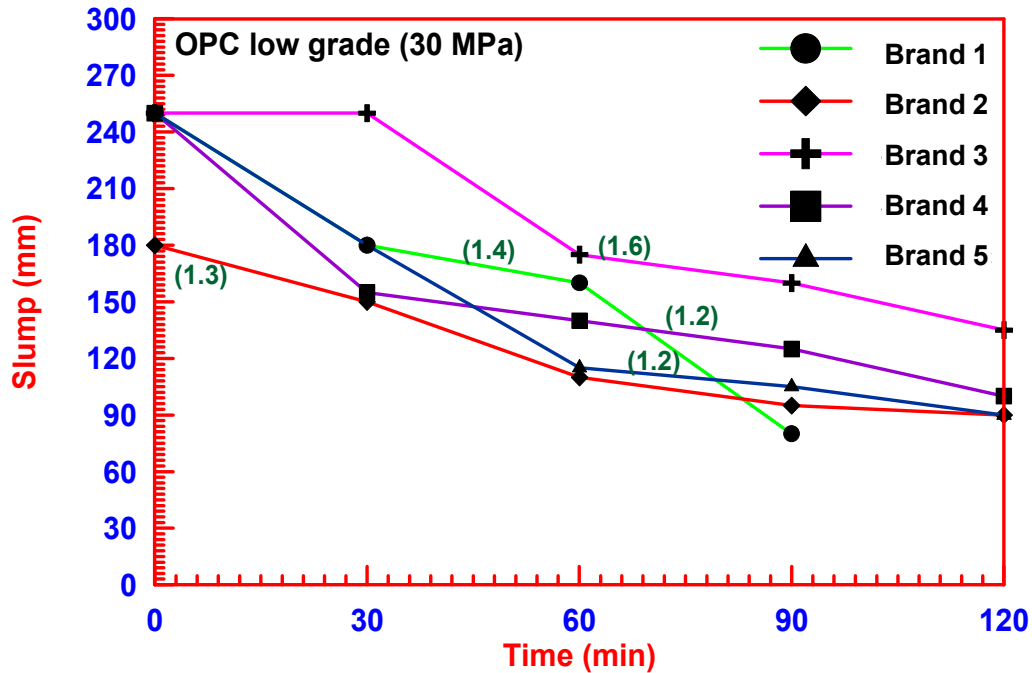
# Results of laboratory trials

| Brand                    |         | # 1  |      | # 2  |      | # 3  |      | # 4  |      | # 5  |      |
|--------------------------|---------|------|------|------|------|------|------|------|------|------|------|
| Cement type              |         | OPC  | PPC  | OPC  | PPC  | OPC  | PPC  | OPC  | PPC  | OPC  | PPC  |
| Admixture dosage (%)     |         | 1.4  | 1.3  | 1.3  | 1.4  | 1.6  | 1.5  | 1.2  | 1.2  | 1.2  | 1.2  |
| Slump (mm)               | Initial | >250 | >250 | 180  | >250 | >250 | >250 | >250 | >250 | >250 | >250 |
|                          | 30 min  | 180  | 250  | 150  | >250 | >250 | >250 | 155  | 190  | 180  | 190  |
|                          | 60 min  | 160  | 200  | 110  | 190  | 175  | 200  | 140  | 150  | 115  | 160  |
|                          | 90 min  | 80   | 160  | 95   | 180  | 160  | 160  | 125  | 145  | 105  | 130  |
|                          | 120 min | --   | 145  | 90   | 170  | 135  | 160  | 100  | 120  | 90   | 110  |
| Strength (MPa)           | 7 d     | 39.3 | 35.3 | 40.3 | 29.5 | 37.0 | 31.0 | 42.7 | 35.3 | 35.4 | 35.9 |
|                          | 28 d    | 55.9 | 47.0 | 54.8 | 46.2 | 49.7 | 45.0 | 56.2 | 48.3 | 51.6 | 50.0 |
| Air content (%) at 2 Hrs |         | --   | 1.9  | 2.4  | 3.3  | 2.5  | 1.5  | 3.0  | 2.2  | 3.3  | 2.7  |

# Results of laboratory trials

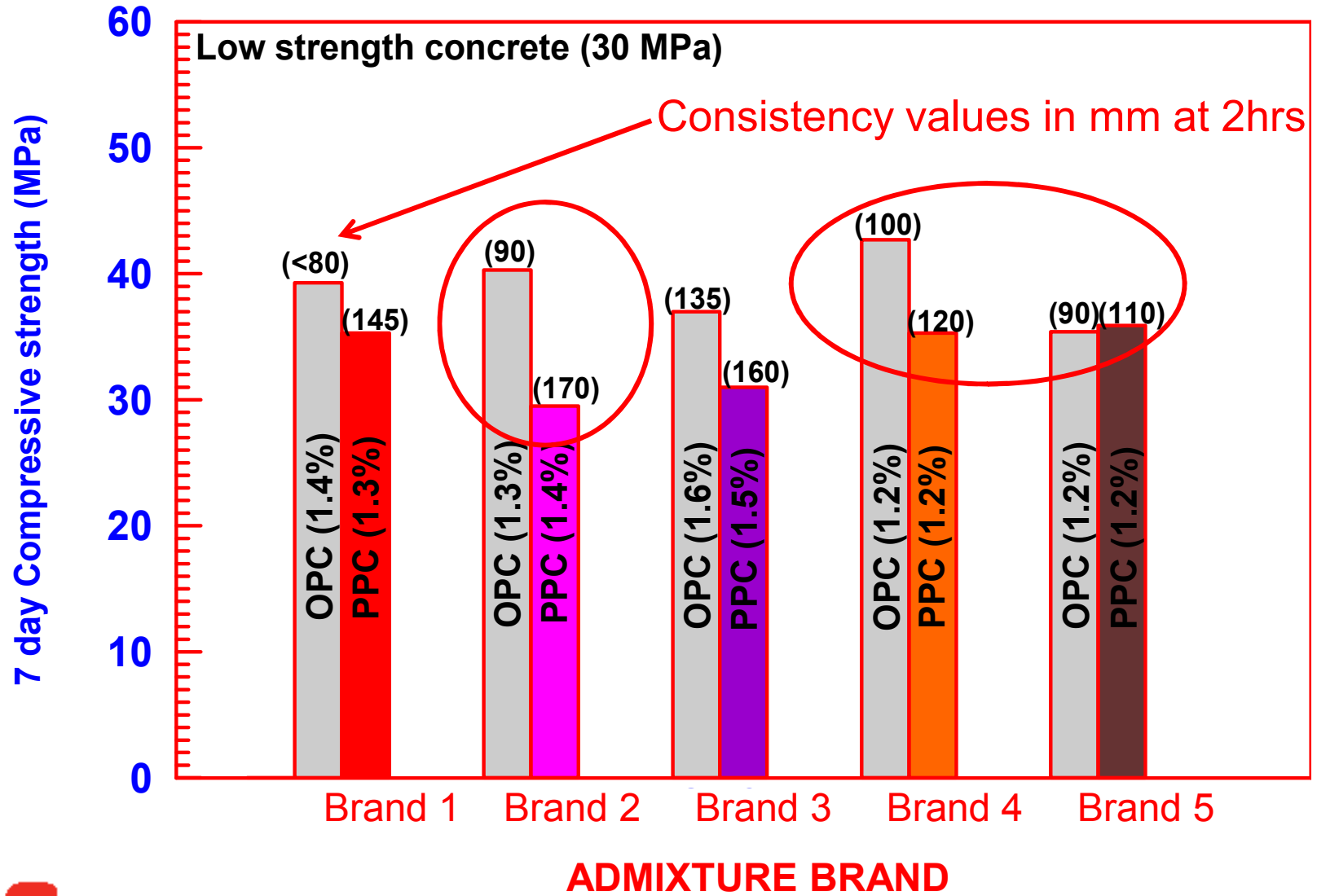
| Brand                    |         | # 1  |      | # 2  |      | # 3  |     | # 4  |      | # 5  |      |
|--------------------------|---------|------|------|------|------|------|-----|------|------|------|------|
| Cement type              |         | OPC  | PPC  | OPC  | PPC  | OPC  | PPC | OPC  | PPC  | OPC  | PPC  |
| Admixture dosage (%)     |         | 1.4  | 1.4  | 1.4  | 1.3  | 1.3  | --  | 1.2  | 1.25 | 1.3  | 1.1  |
| Slump (mm)               | Initial | >250 | >250 | >250 | >250 | >250 | --  | >250 | >250 | >250 | >250 |
|                          | 30 min  | >250 | 250  | >250 | >250 | >250 | --  | 150  | 190  | 180  | 200  |
|                          | 60 min  | 180  | 220  | 160  | 180  | >250 | --  | 130  | 190  | 150  | 160  |
|                          | 90 min  | 160  | 195  | 150  | 180  | 200  | --  | 100  | 175  | 130  | 140  |
|                          | 120 min | 140  | 180  | 115  | 125  | 160  | --  | 100  | 140  | 110  | 110  |
| Strength (MPa)           | 7 d     | 45.4 | 48.0 | 53.1 | 46.0 | 56.8 | --  | 53.1 | 49.5 | 46.7 | 51.6 |
|                          | 28 d    | 68.6 | 62.5 | 70.7 | 65.2 | 67.5 | --  | 68.8 | 59.6 | 65.0 | 65.8 |
| Air content (%) at 2 Hrs |         | 1.5  | 1.6  | 1.1  | 1.5  | 1.9  | --  | 1.6  | 1.3  | 1.7  | 2.5  |

# Slump Retention of low strength concrete

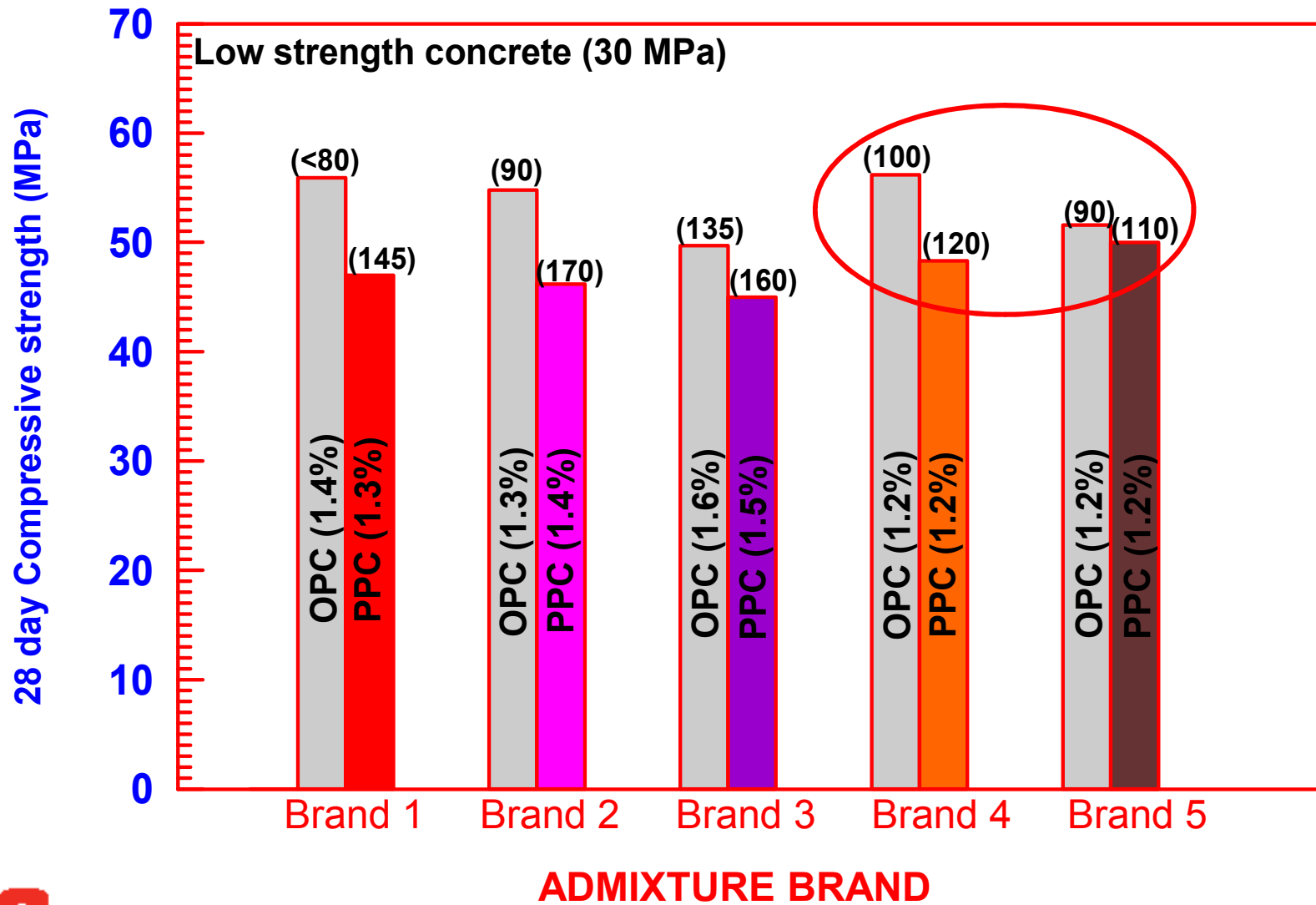




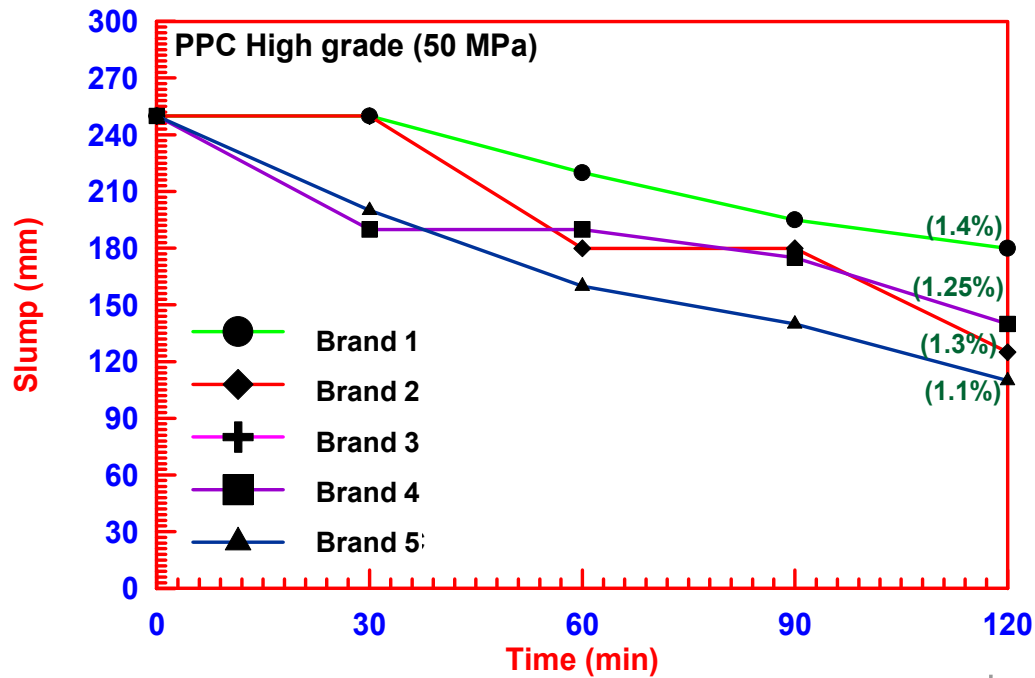
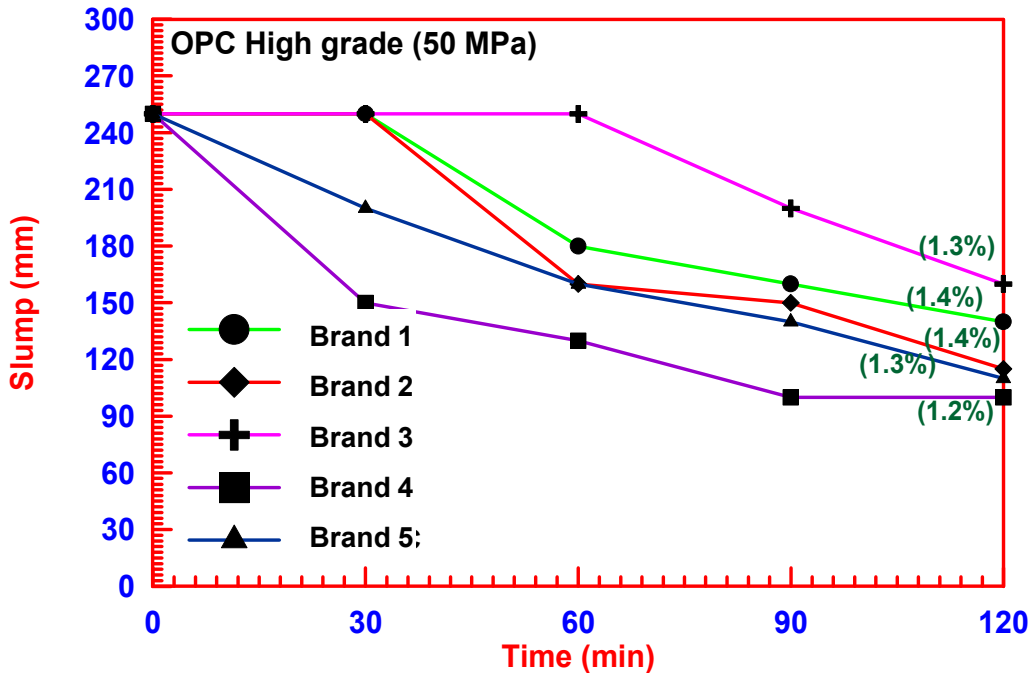
# Trends observed (7 days)



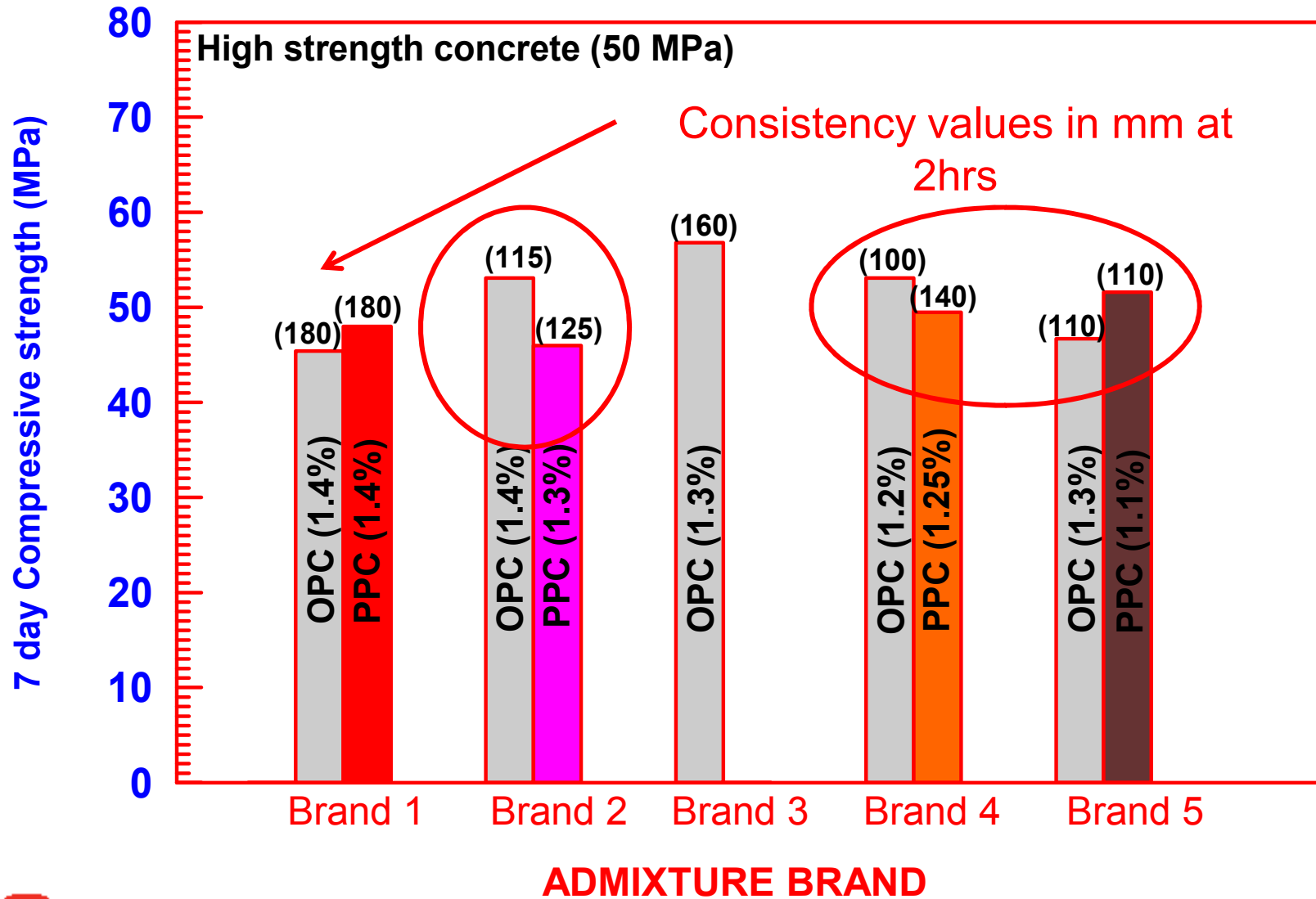
# Trends observed (28 days)



# Slump Retention of high strength concrete



# Trends observed (7 days)



# Trends observed (28 days)

