HIGH-LIFT VERSUS LOW-LIFT GROUTING: WHICH IS THE BETTER OPTION?

Unfortunately, there is no universal answer to this question. Different building types, varying project conditions (such as project schedule, reinforcement placement and congestion, trade coordination, weather, etc.), and preferences of the mason contractor or designer can all drive the use of one grouting procedure over the other.

Despite their frequent use, the terms high-lift and low-lift grouting are not defined within current building codes or standards; rather these terms refer to the different processes of grout placement currently permitted [1]. Prior to reviewing each of these procedures, however, users need to understand two additional terms when it comes to grout placement:

- Grout Pour: the total height of masonry to be grouted prior to the construction of additional masonry (also referred to as pour height or drop height). A grout pour can consist of one or more grout lifts.
- Grout Lift: the vertical height of grout placed at one time.

As shown in the following figure, low-lift grouting refers to the process of constructing discrete sections of masonry in heights not exceeding 5 ft-4 in. (1.63 m). Once the maximum permitted height of masonry is installed, reinforcement is placed in the intended cells followed by the grout. Continuity of the reinforcement is maintained by splicing between each section. In some areas of the country such as the Western US, low-lift grouting with continuous, unspliced, vertical reinforcement for the full story height by placing open ended units (A-block or H-block) around the reinforcement after the first lift.

In high-lift grouting, the height of masonry constructed prior to grouting can be as large as 24 ft (7.63 m), subject to additional grout space limitations [1]. For both high-lift and low-lift grouting, the grout lift is limited to 5 ft-4in. (1.63 m) unless the following conditions can be met, in which case the grout lift can be increased to 12 ft-8 in. (3.86 m):

- the constructed masonry has cured for a least 4 hours,
- the grout slump is between 10 and 11 in. (254 and 279 mm)
- there is no horizontal bond beam reinforcement in the lift except at the top of the lift.

Each grout lift must be consolidated and reconsolidated by mechanical vibration unless self-consolidating grout is used, in which case no consolidation is required and the grout can be placed to the full pour height as long as the constructed masonry has cured for at least four hours.

The code also permits the modification of these prescriptive grout placement procedures provided that the alternative grout placement method(s) can be shown to be adequate through a grout demonstration panel. Additional information on grouting procedures and grout demonstration panels is provided in CMHA TEK 03-02A [2].

The advantages of each method are as follows:

Low-Lift Grouting

- Cleanouts are not required;
- The likelihood of blow-outs is reduced;
- Some fixity is established in reinforced masonry after 12 hours of grout curing offers reduced external bracing requirements under certain conditions.
- Visually seeing and placing the vertical reinforcement at 5 ft-4 in. (1.63 m) intervals may improve the likelihood of reinforcement being properly located.

High-Lift Grouting

- Masons can continue building the wall to greater heights than 5 ft-4 in. (1.63 m) without having move to another section of the wall (greater efficiency).
- More grout and masonry placed in one operation for better efficiency of labor and material delivery.

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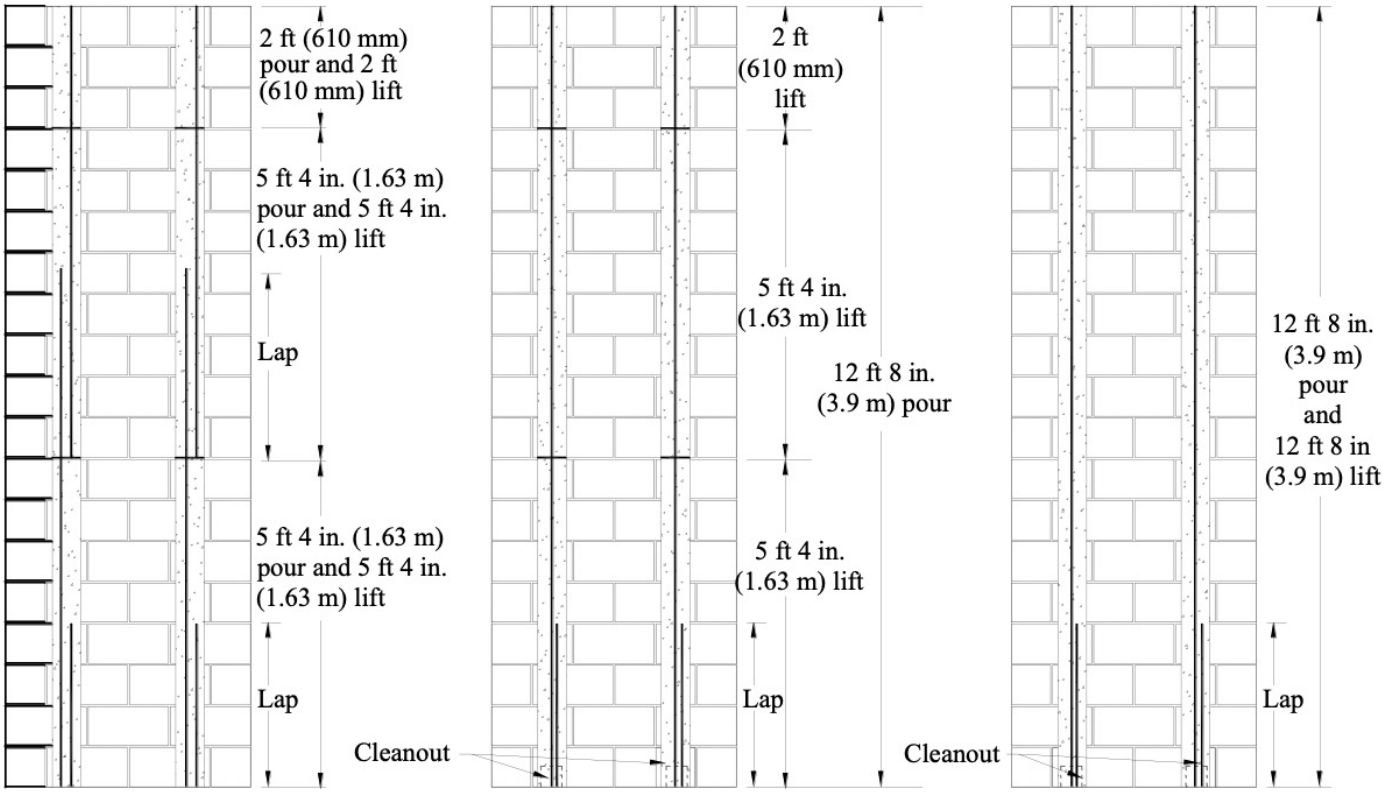

Grouting without cleanouts:
(Low-Lift)
No cleanouts required.
Wall built in 3 stages.
Bars spliced at pour height.
Three grout lifts

Grouting with cleanouts:
(High-Lift)
Cleanouts required.
Wall built full height.
Bars installed full length (no splicing).
Three grout lifts

Grouting with cleanout per MSJC:
(High-Lift alternate)
Cleanouts required.
Wall built full height.
Bars installed full length (no splicing).
One grout lift

Figure 1— Comparison of Grouting Methods for a 12 ft-8 in. (3.86 m) High Concrete Masonry Wall

- Compared to splicing at each lift low lift method
  - Significantly less reinforcement required with fewer splices.
  - Less labor in placing units over stubbed up splice from previous lift.
- Compared to preplacement of reinforcement and using A-block and/or H-block
  - Support and bracing of reinforcement extending substantially above each pour is averted
  - Units with end webs are less likely to break during shipment and handling.

REFERENCES

1. *Specification for Masonry Structures,* TMS 602-13/ACI 530.1-13/ASCE 6-13. The Masonry Society, 2013.

2. *Grouting Concrete Masonry Walls,* CMHA TEK 03-02A, Concrete Masonry & Hardscapes Association.

ABOUT CMHA

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