

The Use of Pneumatic Tools in Repointing Historic Masonry

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This /Technical Note/ has been developed as a result of restoration work undertaken on the Ross House, a Federal style commercial structure remodeled to a residence in the Greek Revival period. The structure is located on the Green in the Woodstock (Vermont) Historic District, listed in the National Register.

Restoration specifications read: Power saws, power chisels, other power and air/abrasive tools shall not be used to remove old mortar from joints without the written approval of the Architect. The mason had employed the pneumatic tools described herein on restoration projects for seven years. He presented his qualifications, product literature on the tool, and a successful demonstration of its application to the required work. Subsequently, the tools and techniques specified below were approved for masonry restoration of the Ross House and several other historic structures.

The specification, together with its bracketed comments, represents a collaborative contribution by the architect (Stephen Smith, AIA, Partner. Northern Architects. Inc., Burlington, Vermont), mason (Michael J. Watson. President. Green Mountain Restoration Co., Shaftsbury, Vermont), tool manufacturer (Norman Akley, Manager, Trow & Holden Company, Barre, Vermont) and architectural conservator, Philip C. Marshall (author). The author accepts responsibility for any faults and omissions in this Technical Note.

Research on this subject was furthered in 1985 in preparation for the University of Vermont Historic Preservation Summer Institute's Masonry Conservation Workshop. Initial development of this Workshop was funded in part by the Faulkner Trust and the New York Community Trust.

MASONRY REPOINTING AND RESTORATION - SECTION 04100

Repointing: Joint Preparation and Unit Removal

1. Only hand tools, used in conjunction with the pneumatic tool specified below, shall be employed to remove deteriorated and/or inappropriate mortar and masonry units.
2. Other power chisels, power saws and air-abrasive tools shall be strictly forbidden without written approval by the Architect.
3. The permitted tool shall be a Barre Short Stroke Pneumatic Carving Tool: Type B or D (Dallett) with a Splitter or Cape Chisel as manufactured by Trow and Holden Co., Inc., 45 South Main Street. Barre, Vermont 05641 (Vermont: 802-476-7121/800-451-4349/ www.trowandholden.com) under the following conditions:



1. The chisel shall have a round shank and be hand held in place in the carving tool with no retainer. A round shank permits the chisel blade to be oriented independent of the tool, an essential feature that is impossible with square-shank tools. The absence of a retainer, or any mechanical connection, enables the user to defeat power of the tool immediately by pulling the chisel away from the piston, without any other action. Precision and control is affected by the tool design enabling one hand to operate the tool, while the other manipulates the chisel. Importantly, this tool was developed as a finishing instrument to sculpt stone for hours at a time.
2. The width of the cutting edge and the diameter of any portion of the chisel blade which enters the masonry joint shall not exceed three-quarters of the width (face thickness) of the mortar joint. Tempered steel chisels are available with carbide tips appropriate for raking out portland mortar and removing stone units. Lime-rich mortar can be removed using a tempered steel blade without a carbide tip. Blades are produced in varying widths ranging from 1/16" to 1/2". The chisel body (flat section) is typically 3" - 4" long but can be manufactured to any length.
3. The compressor activating the carving tool shall have a variable pressure control and be regulated to provide air pressure consistent with effective cutting of the mortar. [Air consumption of the tool varies from 3 to 8 c.f.m. depending on diameter of the piston which ranges from 1/2" to 1-1/4".] Air is controlled three ways:
 1. the compressor (requiring approximately 90-100 p.s.i. for the tool to be run full throttle).
 2. an air stopcock located on the 3/8" pneumatic tubing about two feet from the tool [enabling the tool to be operated with as little as ten p.s.i.] and
 3. by finger control of the exhaust port [effecting a subtle control with back pressure]. Employment of

an incorrectly sized quick-connect coupling may restrict air delivery to the piston. A 25 c.f.m. compressor (with condensation separator) will operate two or three tools concurrently.]

4. In areas located by the Architect provide samples of mortar and masonry unit removal. Samples will be reviewed by the Architect for uniformity and conformance to the Specifications. Samples will serve as the basis for acceptance or rejection of the use of equipment and personnel as determined, in writing, by the Architect.
5. Approved samples shall be marked for identification, retained and protected. Samples shall constitute a standard for acceptance or rejection of completed work. Samples shall not be altered during subsequent work without the Architect's written approval.
6. The approved demonstrator(s) shall be the sole operator(s) of this tool. Employment of any other personnel for this purpose must be approved in writing by the Architect.
7. Protect all masonry to remain as part of final work. An exception to this shall be masonry units, described on the Drawings, that require removal and replacement. This tool may be employed to remove such units.
8. Protect workers and pedestrians from debris and the inadvertent rejection of the chisel from the tool. [To leash the chisel, drill 1/8" hole through square section above the round shank, secure one end of a tempered wire to the chisel, and loosely wrap the other around wrist of hand operating the chisel. Such a modification may be undertaken at the factory. Please contact Trow and Holden Co. for other safety methods and materials.]
4. Inspect masonry surface to determine nature and extent of repointing and unit replacement once chemical cleaning has been completed and approved in accordance with Section 04500. [A base bid can be requested based on areas delineated in the Drawings and called for in the Specifications. Thereafter any changes, estimated by unit or s.f., can be added or deducted to the based bid.]
5. Repoint only joints exhibiting erosion and failure of lime-rich mortar. Do not indiscriminately repoint joints in good condition. Areas requiring repointing include, but are not limited to, those shown on the Drawings.
6. Remove all portland-cement-rich mortar.
7. Remove mortar to a depth 2½ time the thickness of the joint. Remove all loose mortar even if it is deeper than the depth indicated.
8. Remove mortar from both surfaces of adjacent masonry and cut square at the back of the joint.

9. Employ a regulated and light application of compressed air to clean masonry of dust and debris. [Compressor air, regulated using the air stopcock and/or an air valve with trigger, is available by uncoupling the tool.]

Note: This is number 8 in a series of /Technical Notes/, with which we hope, in drawing upon contributions by APT members, to encourage exchange in a variety of technical areas. Subjects contemplated for this series include extant recording, building inspection, material conservation, structural repair, building systems conservation, and energy conservation.

Please write to /Communiqué/ if you would like to make a technical notes contribution.

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/Technical Notes/ represent on-going research. The information given and conclusions reached are those of the author. Comments are invited.



Operator using $\frac{3}{4}$ "-D Tool with $\frac{1}{8}$ " Cape Chisel on Mortar Joint



Operator showing easy removal of round shank from 3/4"-D air tool