

SS-C-1302B

September 27, 1971

SUPERSEDING

Int. Fed. Spec. SS-C-001302A(GSA-FSS)

April 30, 1968

FEDERAL SPECIFICATION

CONCRETE PATCHING AND LEVELING COMPOUND

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers patching and leveling compounds for bonding to hardened concrete and other surfaces, including wood.

1.2 Classification. The patching and leveling compounds shall be of the following types and classes as specified (see 6.2):

Type I - Water activated mixes.

Class A - Leveling compound.

Class B - Patching compound.

Type II - Non-water activated mixes.

Class A - Leveling compound.

Class B - Patching compound.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

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(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Standard:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Material (ASTM) Standards:

- C109 - Compressive Strength of Hydraulic Cement Mortars (Using 2-inch Cube Specimens), Test for.
- C138 - Weight Per Cubic Foot, Yield, and Air Content (Gravimetric) of Concrete, Test for.
- C190 - Tensile Strength of Hydraulic Cement Mortars, Test for.
- C192 - Making and Curing Concrete Test Specimens in the Laboratory.
- C290 - Resistance of Concrete Specimens to Rapid Freezing and Thawing in Water, Test for.
- C305 - Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency.
- C307 - Tensile Strength of Chemical-Resistant Resin Mortars, Test for.
- C321 - Bond Strength of Chemical-Resistant Mortars, Test for.
- C404 - Aggregates for Masonry Grout, Specification for.
- C494 - Chemical Admixtures for Concrete, Specification for.
- C511 - Moist Cabinets and Rooms Used in the Testing of Hydraulic Cements and Concretes, Specification for.
- E42 - Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials, Recommended Practice for.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA. 19103.)

3. REQUIREMENTS

3.1 Material.

3.1.1 Type I ingredient material shall be at the discretion of the manufacturer. However, when mixed in accordance with manufacturer's instructions, the compound shall meet test requirements specified herein. At the time of inspection powder components shall be free flowing and shall not exhibit any evidence of caking and liquid emulsion components shall be stable aqueous dispersions and shall show no curdling, gummy sediment nor any settlement that cannot be readily dispersed to a homogeneous state during the shelf life of the materials.

3.1.2 Type II material shall consist of a synthetic resin base material, curing agent or catalyst, and aggregate. The resinous base component and curing agent or catalyst may contain reactive modifiers but no volatile diluent.

3.2 Color.

3.2.1 Class A, both types leveling compound. Compound shall be of a color as specified (see 6.2).

3.2.2 Class B, both types patching compound. Compound shall blend with the gray color of concrete, unless otherwise specified (see 6.2).

3.3 Standard conditions. Standard conditions shall be a temperature of $23 \pm 2.2^{\circ}\text{C}$ ($73.4 \pm 4^{\circ}\text{F}$) and a relative humidity of 50 percent ± 5 percent.

3.4 Physical requirements of type I mixes. When tested in accordance with 4.3, Table IV, type I mixes shall meet the requirement of Table I.

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TABLE I. Physical requirements , type I mixes

Property	Requirements	
	Minimum	Maximum
Bond strength, p.s.i.	200	-
Tensile strength, p.s.i.	400	-
Compressive strength, p.s.i.	3000	-
Density, p.c.f.	110	-
Freeze/thaw resistance, no. of cycles:		
Class A	100	-
Class B	25	-
Accelerated weathering,		
Loss after 300 cycles, % by wt.	-	3

3.5 Physical requirements of type II mixes. When tested in accordance with 4.3, Table IV, type II mixes shall meet the requirements of Table II.

TABLE II. Physical requirements , type II mixes

Property	Requirements	
	Minimum	Maximum
Bond strength, dry 7 days, p.s.i.	500	-
Bond strength, wet 8 days, % of dry bond strength	80	-
Tensile strength, 3 days, p.s.i.	300	-
Tensile strength, 7 days, p.s.i.	500	-
Freeze/thaw resistance, no. of cycles:		
Class A	100	-
Class B	25	-
Accelerated weathering,		
Loss after 300 cycles, % by wt.	-	3

3.6 Crumbling and cracking. Class A leveling compounds shall show no evidence of crumbling or cracking when tested in accordance with 4.3.1.

3.7 Separation. Class B patching compounds shall not show any visible sign of separation when tested in accordance with 4.3.2.

3.8 Workmanship. The component ingredients shall be processed as required, in accordance with good commercial practice.

3.9 Instructions.

3.9.1 Handling instructions. Since many of these materials contain toxic ingredients, the manufacturer shall furnish all necessary instructions for the safe handling and storage of these materials. In addition, instructions shall be given with respect to items of personal protective equipment and apparel necessary for eye, skin, and respiratory protection and for ventilation and fire safety precautions to be taken when using mortars with flammable properties.

3.9.2 Mixing instructions. Complete mixing instructions shall be furnished to the purchaser by the supplier. Safe mixing temperatures should be stated plus the related working life of the mixed material.

3.9.3 Curing instructions. Complete instructions necessary to insure proper curing of the mixed materials shall be furnished by the supplier. This shall include the range of ambient temperatures permissible for successful application of the material. Date of manufacture and shelf life must be given for those items which have a limited shelf life. The handling, mixing, and curing instructions shall be placed on the outside of all containers of each component by stencil, lithograph, or securely affixed labels.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Sampling and inspection.

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4.2.1 Lot. Unless otherwise specified (see 6.2), a lot shall consist of all mixes offered for delivery at the same time.

4.2.2 Sampling. Mixes shall be sampled in accordance with level S-2 in MIL-STD-105.

4.2.3 Inspection. Samples selected in accordance with 4.2.2 shall be examined for defects listed in Table III. The acceptable quality levels (AQL's) for defects shall be 2.5 percent defective for major defects and 6.5 percent defective for minor defects.

TABLE III. Classification of defects, mixes

Defects	Major	Minor
Powders caked or not free flowing	X	
Liquids not homogeneous	X	
Damage or defects affecting use or serviceability	X	
Damage or defects not affecting use or serviceability		X

4.3 Tests. Samples shall be tested as specified in Table IV and as hereinafter specified.

TABLE IV. Index

Characteristics	Requirement reference	<u>Applicable test</u>	
		ASTM test	Paragraph reference
Bond strength, Type I <u>1/</u>	Table I	C 321	-
Bond strength, Type II	Table II	C 190	4.3.3
Tensile strength, Type I <u>1/</u>	Table I	C 307	-
Tensile strength, Type II	Table II	C 190	4.3.4
Compressive strength, Type I	Table I	C 109	-
Density, Type I	Table I	C 138	-
Freeze/thaw resistance	Tables I & II	C 290	4.3.5
Accelerated weathering	Tables I & II	E 42	4.3.6
Crumbling and cracking, Class A	3.6	-	4.3.1
Separation, Class B	3.7	-	4.3.2

1/ Specimens shall be air-dried for 28 days at standard conditions before testing.

4.3.1 Crumbling and cracking, types I & II, Class A only. Prepare a small batch of leveling compound and place it on a cleaned concrete slab. Patch must cover at least 36 square inches. Trowel to a feather edge. Cure as recommended and let the compound set at least 16 hours, then examine the edge (see 3.6). Use grout containing fine sand for class A, type II.

4.3.2 Separation, types I & II, Class B only.

4.3.2.1 Specimen. Prepare a concrete specimen of any convenient size containing a hole 1-inch in diameter and 3-inches deep. The hole can be provided by either casting in place using a 1-inch diameter wooden dowel or rod or by core drilling. The specimen must be properly cured (ASTM C 190) for at least 24 hours before proceeding.

4.3.2.2 Compound application. Prepare a small batch of patching compound using sharp sand and clean aggregate. Fill the hole in the specimen and when partially set, trowel the patch flush. Cure as recommended and let set at least 16 hours then examine the edge between the patching compound and the specimen (see 3.7).

4.3.3 Bond adhesion strength, type II mixes. Prior to the time of the test, portland cement mortar briquets are cast in accordance with ASTM C 190 except that the mortar mix prescribed in ASTM C 109 is used. After curing for at least 28 days in accordance with ASTM C 190, they are ready to be used in the bond test.

4.3.3.1 Specimen preparation, type II. Five portland cement briquets are sawed in half and the sawed faces scrubbed with a stiff brush to remove loose fines. The briquet halves should be kept saturated with water until bonded to the mortar being evaluated. One half briquet is placed in the brass mold after removing excess water with a dry cloth. Type II mortar is mixed in accordance with 4.3.4.1. The sawed face can be primed as required in accordance with manufacturer's instructions. The mortar is placed in the other half of the mold in two layers. The first layer is scrubbed into the face of the briquet with the finger and tamped slightly to fill all corners and remove entrapped air. The second layer is tamped slightly to insure complete contact with first layer and leveled with a steel trowel. Plastic gloves should be worn to protect the hands. The mold should be treated with a mold release compound, both inside and out, such as Lubraloy. All specimens should be cured in the mold at standard conditions for at least 24 hours or in accordance with manufacturer's recommendation. They should then be removed from the mold and stored at standard conditions until tested. Five combination briquets are tested dry in tension at age seven days. The other five briquets are placed in water at age seven days for 24 hours and tested immediately after removal from the water (age eight days). Testing

shall be in accordance with 4.3.4. The average of five specimens shall be reported as the tensile bond strength of the type II mortar patching or leveling compound.

4.3.4 Tensile strength type II mixes. The same briquet molds as required by ASTM C 190 shall be used for the tensile test, coating all surfaces inside and out with a suitable mold release compound. At least 10 briquets shall be cast from type II mortar prepared in accordance with 4.3.4.1. The molds shall be filled in two layers tamping slightly to insure that they are completely filled. A steel trowel shall be used to strike off the excess material and to smooth the surface. The briquets shall remain in the molds at standard conditions for at least 24 hours after which time they shall be removed and stored at standard conditions until tested in tension. Five briquets shall be tested in accordance with ASTM C 190 at age three days and five at age seven days. The speed of testing shall be 1.27 millimeters (0.05 inch) per minute and loading rate 272 kilograms (approximately 600 pounds) per minute. A Universal Tester of the Instron type can be used. The average tensile strength of the five briquets shall be reported as the tensile strength of the mortar.

4.3.4.1 Mixing of type II mortar. The same mixing apparatus as that described in ASTM C 305 is used for mixing type II mortar. Weigh approximately 200 grams of base component into the mixing bowl and add the proper amount of the activator (curing agent). Mix at slow speed for one minute; stop the mixer and scrape the sides and bottom of the bowl to insure complete mixing. Remix for one minute and while mixing, add the proper amount of aggregate as recommended by the manufacturer. In the absence of the manufacturer's recommendation, the mix design should be 6.5 parts of aggregate to one part of binder by weight. Natural sand conforming to size No. 2 "Aggregates for Masonry Grout," ASTM C 404 should be used if none is supplied by the manufacturer. Project aggregate should be used if at all possible. The size of the batch can be adjusted to meet the manufacturer's recommendations or quantities supplied as a unit package as long as the capacity of the mixer is not exceeded. Mix three minutes at slow speed, scrape the sides and bottom as well as the mixer blade and mix for an additional 1/2 minute.

4.3.5 Resistance to freeze/thaw.

4.3.5.1 Class A, type I or type II. Concrete prisms 35.6 x 7.6 x 7.6 centimeter (14 x 3 x 3 inch) shall be cast from a good, sound, air-entrained concrete mix containing 1.9 centimeter (3/4 inch) maximum size aggregate. The prisms shall be cured in a moist room or cabinet as defined by ASTM C 511 for at least 28 days at $23 \pm 2.2^{\circ}\text{C}$ ($73.4 \pm 4^{\circ}\text{F}$) before using as test specimens. Immediately before using, the surface of the test prisms shall be sandblasted to remove dirt, grease, and unsound concrete; soaked 24 hours in water and then scrubbed with a stiff bristle brush to remove fines. They shall approach a saturated surface dry condition by allowing them to dry for one hour in air at standard conditions. The surface is then covered with a 1/2-inch thickness

of class A, type I or type II mortar under test. Type I mortars should be mixed in accordance with ASTM C 305 or the manufacturer's instructions. Type II mortars shall be mixed in accordance with 4.3.4.1 or the manufacturer's instructions. Surface can be primed if required by the manufacturer or contract specifications. The mortar should be placed in two layers with the first layer being scrubbed into the surface to insure good bond. The second layer should be tamped in place to compact it and remove air. Excess mortar is removed with a steel trowel and the patch smoothed and finished. Wiping the trowel on a rag dampened with toluene will aid finishing. The repaired prism should be cured under standard conditions for at least seven days but not longer than 10 days before testing. The laminated specimen is then placed in a freeze/thaw cabinet and cycled between -17.8°C and 4.4°C (0°F and 40°F) in accordance with ASTM C 290. The laminated specimen must withstand at least 100 cycles of freeze/thaw without failure. Leveling compound has failed if it shows any sign of surface spalling, cracking, bond failure, or separation.

4.3.5.2 Class B, type I or type II. Freeze/thaw test panels $30.5 \times 43.2 \times 7.6$ centimeter ($12 \times 17 \times 3$ inch) as shown in figure 1 shall be cast from a good, sound, air-entrained concrete mix containing 1.9 centimeter ($3/4$ inch) maximum size aggregate. The freeze/thaw test panels shall be cured in a moist room (100% relative humidity) for at least 28 days at $23 \pm 2.2^{\circ}\text{C}$ ($73.4 \pm 4^{\circ}\text{F}$) before using as test specimens. Immediately before using, the cavities in the test panels (see fig 1) shall be sandblasted to remove dirt, grease, and unsound concrete; soaked 24 hours in water and then scrubbed with a stiff bristle brush to remove loose fines. They shall approach a saturated surface dry condition by allowing them to dry for one hour in air at standard conditions. The cavities are then filled using the mortar under test. Type I mortars shall be mixed in accordance with ASTM C 305 or the manufacturer's instructions. Type II mortars shall be mixed in accordance with 4.3.4.1 or the manufacturer's instructions. Cavities can be primed if required by the manufacturer or contract specifications. The mortar should be placed in two layers with the first layer being scrubbed into the surface to insure good bond. Care should be taken to completely fill the corners of the patch. The second layer should be tamped in place to compact it and remove air. The excess mortar is removed with a steel trowel and the patch smoothed and finished. Wiping the trowel on a rag dampened with toluene will aid finishing. One freeze/thaw test panel containing two cavities should be prepared for each material under test. The repaired slab should be cured under standard conditions for at least seven days but not longer than 10 days before testing. The panel is then placed in a freeze/thaw cabinet and covered with water. (Water is ponded on the surface by the retaining dam molded with the slab.) The panel is then cycled through a temperature range from -12°C to 50°C (10°F to 122°F) with a six-hour period for each cycle. (One cycle consists of going from low temperature to high and back

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to low again.) Four complete cycles can be made each day and cycling should be arranged so that daily inspection can be made during the thaw cycle. The surface of the panel should be covered with water throughout the test and additional water should be added daily if required. The patches must withstand at least 25 cycles of freeze/thaw without failure. Patches have failed if they show any sign of surface spalling or cracking, bond failure, separation, or perimeter cracking.

4.3.6 Weatherometer test. Three panels of type I or type II mortar 6.35 x 13.97 x 0.64 centimeter (2 1/2 x 5 1/2 x 1/4 inch) shall be laminated to asbestos-cement panels 7.62 x 15.24 x 0.48 centimeters (3 x 6 x 3/16 inch) using the same type mix as in 4.3.4.1 or manufacturer's instructions. Asbestos-cement panels should be clean and primed as specified by manufacturer before bonding the mortar mix to them. Panels shall be air cured at standard conditions for seven days before placing in a Weatherometer. Weigh the panels after curing and again after 300 cycles to determine weight loss and conformance with specification requirements. Dry 2 hours at 60°C (140°F) and condition to 25°C (77°F) before weighing. Operation of the Weatherometer shall be in accordance with ASTM E 42, Type D. Each cycle shall consist of 51 minutes of carbon arc light only, followed by 9 minutes of light plus water spray, 20 cycles per day. Panels shall be examined daily for signs of severe weathering, warping, or bond failure between the mortar and the panel.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing and marking. Unless otherwise specified (see 6.2), the compound covering shall be prepared for shipment to afford protection against deterioration and damage, which will insure acceptance and safe delivery at the lowest rate to the ultimate destinations. The supplier may use his commercial practice providing it fulfills the above requirements. Type II materials shall be packaged in kits.

6. NOTES

6.1 Intended use. Compounds prepared from mixes covered by this specification are intended for anchoring fasteners and posts, repairing cracks in concrete and breaks in concrete and stone. It can also be used for smoothing floors prior to laying linoleum and various types of plastic and ceramic floor tile. Type I compound is primarily intended for indoor use or for protected, limited or temporary work. Type II compound is primarily intended for outdoor use or where extensive permanent bonding to hardened concrete is required. Both types of compounds are intended to be used when ambient temperature is between 10°C and 37.8°C (50°F and 100°F).

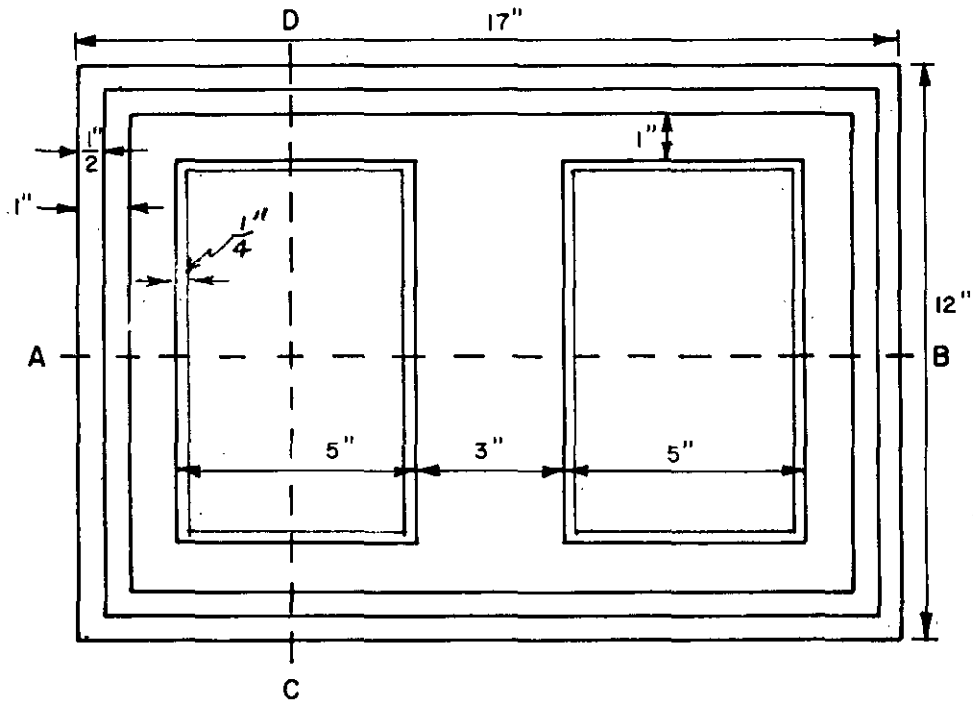
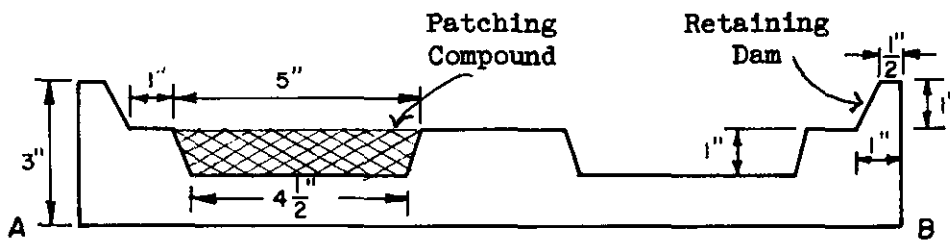
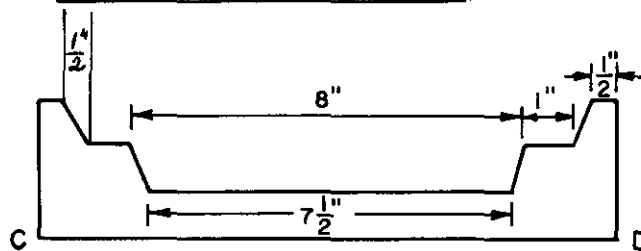
TOP VIEWCROSS SECTION - A - BCROSS SECTION - C - DFREEZE / THAW TEST PANELSCALE $\frac{1}{4}'' = 1''$

FIGURE 1

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6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Type and class of compound desired (see 1.2).
- (c) Color desired (see 3.2.1 and 3.2.2).
- (d) Size of lot if different from 4.2.1.
- (e) Whether detailed packaging, packing, and marking is required (see 5.1).

MILITARY INTEREST

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Army - CE

Review Activity:

Air Force - 84

CIVIL AGENCIES INTEREST:

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SPECIFICATION		
ORGANIZATION (Of submitter)		CITY AND STATE
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<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING.		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.		
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3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO IF "YES", IN WHAT WAY?		
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