January 14, 2019

By email: ResFurnPet2018PET0017@ee.doe.gov

Mr. Eric Stas
U.S. Department of Energy
Office of the General Counsel
1000 Independence Avenue SW
Washington, DC 20585

NEMA Comments on Petition of Air-conditioning Heating & Refrigeration Institute to amend Test Procedure Rule for Consumer Warm Air Furnaces

Docket No. EERE-2018-BT-PET-0017

Dear Mr. Stas:

As the leading trade association representing the manufacturers of electrical and medical imaging equipment, the National Electrical Manufacturers Association (NEMA) provides the attached comments on the DOE Notice of Petition of the Air-conditioning Heating & Refrigeration Institute to amend the Test Procedure Rule for Consumer Warm Air Furnaces. These comments are submitted on behalf of NEMA Motor and Generator Section Member companies.

The National Electrical Manufacturers Association (NEMA) represents nearly 350 electrical equipment and medical imaging manufacturers that make safe, reliable, and efficient products and systems. Our combined industries account for 360,000 American jobs in more than 7,000 facilities covering every state. Our industry produces $106 billion shipments of electrical equipment and medical imaging technologies per year with $36 billion exports.

If you have any questions on these comments, please contact Alex Boesenberg of NEMA at 703-841-3268 or alex.boesenberg@nema.org.

Sincerely,

Philip Squair
Vice President, Government Relations
National Electrical Manufacturers Association
COMMENTS OF THE NATIONAL ELECTRICAL MANUFACTURING ASSOCIATION (NEMA)

Petition of Air-conditioning Heating & Refrigeration Institute (AHRI)
To amend Test Procedure Rule for Consumer Warm Air Furnaces

Executive Summary

1. NEMA applauds the initiative of AHRI and the intended reduction of regulatory burden by its proposal to consolidate three different test procedures and energy conservation metrics into a single metric for consumer furnaces, which purports to unify the rulemaking process for consumer furnaces to reduce the number of regulatory activities applicable to this covered product. The regulatory burden described by AHRI is a creature of the underlying statute enacted by Congress which has layered regulatory requirement upon regulatory requirement for the same product rather than looking at energy efficiency regulation more systematically.

2. NEMA has very serious doubts – as should DOE – that the proposal outlined in the AHRI Petition will comply with statutory requirements set forth in the Energy Policy and Conservation Act (EPCA), 42 U.S.C. §6291 et seq. without some modification of the AHRI proposal. See 42 U.S.C. §6295(o)(1). Although the AHRI Petition is formally directed as an amendment to its test procedure the Petition is, by its own admission, ultimately directed toward modifying energy conservation standards and that is where the statutory conflict arises. See Pet., 83 FR 56746, 56750 (November 14, 2018)(“The transition from three independent metrics to one integrated product metric will demonstrably ‘alter the measured efficiency.’”). NEMA explains its views in further detail herein, and offers a constructive recommendation that will ensure statutory compliance as DOE proceeds to review and respond to the Petition. NEMA urges DOE to deny the Petition, but that AHRI be encouraged to reformulate its proposed metric to assure compliance with EPCA.

3. NEMA calls upon DOE to rescind and withdraw the “Enforcement Policy Statement - Furnace Fans” that DOE issued on November 2, 2018. While we agree that DOE has discretion in some cases to issue enforcement policy statements for a period of time to address circumstances presented by legal or statutory uncertainties or temporary market circumstances, this is not such a case. As presented, the Enforcement Policy Statement for Furnace Fans is more transparently amending the impending Compliance Date of the Furnace Fan Rule. See 79 FR 38130 (July 3, 2014)(setting Compliance Date for Furnace Fan Rule of July 3, 2019). Case law is clear, however, that DOE cannot amend an effective date for compliance with a DOE energy conservation standard without notice and comment rulemaking under the Administrative Procedure Act. NRDC v. Abraham, 355 F.3d 179 (2nd Cir. 2004). That did not occur here: the AHRI request for a non-enforcement statement and DOE’s issuance of the non-enforcement statement occurred on the same day. While DOE may have greater discretion to defer reporting and certification requirements and its enforcement of the law, that discretion cannot effectively be tantamount to a waiver of test procedures or granting a hardship application. There are formal procedures already in place that create conditions precedent for that type of relief, see 10 CFR §1003.20 et seq. and 10 CFR 430.27, and DOE’s enforcement statement evades those procedures. There are no

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1 For example, one situation that could warrant a non-enforcement policy would be where members of Congress indicated to DOE that Congress is taking action to address an issue that was not contemplated by Congress or to correct statutory text.
unique hardships presented by implementation the Furnace Fan Rule. NEMA members and AHRI members have been working together to implement the Rule for a number of years.

DETAILED COMMENTS

I. The regulatory burden described by AHRI is a creature of the underlying statute enacted by Congress, which has layered regulatory requirement upon regulatory requirement for the same product rather than looking at product system-wide energy efficiency regulation.

With one exception, EPCA expressly contemplates component regulation of product systems. We can question the wisdom of that congressional choice or suggest to Congress that there is a better way, but the evolution of EPCA since 1975 has focused on component regulation in many respects. For example, Congress specified in EPCA energy conservation requirements for “metal halide lamp fixtures” and chose to regulate the fixture’s ballast, a component. See 42 U.S.C. §6295(hh). Congress also directed DOE to consider energy conservation standards for another component of the fixture, the metal halide lamp. 42 U.S.C. §6317 (“high intensity discharge lamps” include, inter alia, metal halide lamps). Congress has also specified the regulation under EPCA of electric motors, which are a component part of other covered products such as pumps, commercial and industrial fans, walk-in coolers and freezers, commercial refrigeration equipment, 3-phase commercial air-cooled air conditioners, commercial and industrial motors, and commercial compressors. Congress also authorized DOE to regulate fans, see 42 U.S.C. §6311(2)(B)(ii), which are components of other covered products such as furnaces. Congress decision to require regulation of “electricity used for purposes of circulating air through duct work” is another example of component regulation.

In the case of the residential furnace, Congress has clearly contemplated multiple regulations for different aspects of the same covered product.

II. Statutory problems with the AHRI Proposal and a solution to solve the problem.

In the Energy Independence and Security Act of 2007 (EISA-2007), Congress required DOE to “consider and prescribe energy conservation standards or energy use standards for electricity used for purposes of circulating air through duct work” not later than December 31, 2013. 42 U.S.C. §6295(f)(4)(D). The DOE did just that when it adopted its furnace fan rule published July 3, 2014. 79 FR 38130 (July 3, 2014)(establishing a “fan energy rating” or FER as an energy conservation standard for furnace fans). DOE now considers furnace fans to be a “covered product” under EPCA. See 82 FR 57240, 57246 (December 4, 2017)(“These covered products and covered equipment, including all product or equipment classes, include: *** (43) furnace fans;***”). DOE’s Final Rule for furnace fans recites a very significant estimate of energy

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2 The exception is that manufacturers of covered products using “small electric motors” need not use small electric motors meeting the energy conservation standard for small electric motors established in a rulemaking for those motors required by 42 U.S.C. §6317(b)(2)(adopted March 9, 2010 at 75 FR 10874). See 42 U.S.C. §6317(b)(3).

3 DOE later determined that standards for high intensity discharge lamps could not be economically justified. 80 FR 76355 (December 9, 2015).
savings from compliance with the rule that regulates electricity used for purposes of circulating air through duct work. 79 FR at 38131 (3.99 quads over 30 years). The regulation proposed by AHRI would negatively impact those energy savings if it compromises FER.

Furnaces consume natural gas, propane, or home heating oil as a fuel to heat homes, and consume electricity to move air from the furnace to areas in a building. In 1987, Congress amended EPCA to require that furnaces manufactured after January 1, 1992 have an annual fuel utilization efficiency of not less than 78 percent. In the same legislation, Congress further required DOE, subject to certain conditions, to prescribe an energy conservation standard by January 1, 1989 for furnaces having an input of less than 45,000 Btu per hour applicable to furnaces manufactured after January 1, 1992. 42 U.S.C. §6295(f)(1). Congress further directed DOE to undertake another rulemaking for furnaces between January 1, 1997 and January 1, 2007 to determine whether the annual fuel utilization efficiency standards should be amended, which would apply to furnaces manufactured after January 1, 2012. 42 U.S.C. §6295(f)(4)(C). It is clear that in 2007 when Congress directed DOE to “prescribe energy conservation standards or energy use standards for electricity used for purposes of circulating air through duct work,” Congress knew EPCA was already regulating natural gas (or other fuel) consumption in residential furnaces. In the EISA-2007 amendment, Congress directed DOE to regulate electricity consumption separately: the statute refers to prescribing “standards for electricity used for purposes of moving air through duct work.” Knowing that it was already regulating other fuels in a furnace, Congress could have directed DOE to undertake a total energy consumption approach to regulating a furnace system – but it did not.

During the furnace fan rulemaking that led to the furnace fan energy conservation standard, commenters actually raised a systems approach to furnace regulation as an alternative to regulating electricity in furnaces. See 79 FR at 38145:

Ingersoll Rand went further and suggested a system-level regulatory approach, where the entire duct and furnace system would be regulated, maintaining that such approach would produce a more useful metric to consumers when evaluating performance.

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Ingersoll Rand argued that as the efficiency of the furnace fan motor increases, it dissipates less heat, and consequently, the furnace will consume more gas to compensate and meet the desired house heat load.

DOE responded that the furnace system approach was not consistent with the statutory directive provided by Congress for this specific rulemaking.

In the NOPR, DOE responded by explaining that DOE is required by EPCA to consider and prescribe new energy conservation standards or energy use standards for electricity used for purposes of circulating air through duct work. (42 U.S.C. 6295(f)(4)(D)). Consequently, in the context of furnace fans, DOE does not have latitude to apply only a single standard for the larger HVAC product (which is already regulated). Pursuant to this statutory mandate, DOE issued a NOPR which proposed energy conservation standards for circulation fans used in residential central HVAC systems ld. (emphasis supplied).
But DOE added that it “recognized that component-level regulations could have system-level impacts. Accordingly, DOE conducted its NOPR analyses and selected the standard levels proposed in the NOPR in such a way that meets the statutory requirements set forth by EPCA without ignoring system effects, which otherwise might compromise the thermal performance of the HVAC products that incorporate furnace fans.” *Id.* DOE addressed the furnace system-level impact in the best way it could, given the clear statutory directive to “prescribe energy conservation standards or energy use standards for electricity used for purposes of circulating air through duct work”. 42 U.S.C. 6295(f)(4)(D). While the AHRI Petition is not without merit in certain respects, the Petition cannot relitigate these issues nearly five years later on the eve of the Final Rule’s compliance date.4

EPCA’s anti-backsliding provision, 42 U.S.C. §6295(o)(1), is another statutory provision that will ultimately have to be addressed and cannot be violated. This provision states:

(1) The Secretary may not prescribe any amended standard which increases the maximum allowable energy use, or, in the case of showerheads, faucets, water closets, or urinals, water use, or decreases the minimum required energy efficiency, of a covered product. (emphasis supplied)

As noted above, a furnace fan is a distinct covered product, and DOE has clearly said it considers the furnace fan a distinct covered product. See 82 FR 57240, 57246 (December 4, 2017). The Furnace Fan Final Rule reached that exact same conclusion. See *supra*, 79 FR at 38175 (“However, DOE is required by legislation to set a separate standard and an associated metric for the covered product, furnace fans.”). Whatever DOE might be able to accomplish in terms of establishing a single metric for energy consumption by a residential furnace in response to the Petition, DOE will have to still maintain the minimum required energy efficiency found in the FER (or its equivalent) for electricity consumed by the covered product --- the furnace fan. That metric cannot be compromised under the anti-backsliding provision because of the way the statute is written: the Secretary cannot amend the furnace standard in a way that increases electricity use by furnace fans or decreases minimum electrical efficiency by a furnace fan from the present FER.

While the Furnace Fan Final Rule does not expressly prescribe a specific motor technology that would be used with FER-compliant furnace fans, the Final Rule clearly explains that DOE selected an energy conservation standard as economically justified and technologically feasible that anticipated furnace fan manufacturers would use electronically commutated motors (ECM)5 to meet the minimum FER. ECMs are “brushless permanent

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4 If the furnace industry believed that DOE’s statutory construction was not consistent with law, it could have sought judicial review of the Furnace Fan Final Rule within 60 days of July 3, 2014. It did not, and finality was brought to this issue that manufacturers of motors and furnace fans have relied upon for almost five years and made investment plans in reliance on that construction.

5 The phrase “electronically commutated motors” refers to constant-torque brushless permanent magnet motors and constant-airflow brushless permanent magnet motors. Commutation refers to converting direct current into alternating current inside the motor, and is done, in a direct current motor via “commutators.” An electronically commutated motor (ECM) uses a microprocessor controller that sequentially energizes/de-energizes each winding of the stator with power to generate an electrical current. The microprocessor uses a closed loop feedback
magnet motors.” One type of ECM is the “constant-torque brushless permanent magnet (BPM) motor,” and the second type is the “constant airflow brushless permanent magnet motor.” In the Final Rule, DOE considered six Trial Standards Levels (TSLs) for possible adoption. Each TSL varied based on the motor technology used with the furnace fan. TSL-1 and TSL-2 contemplated that a furnace fan manufacturer could use a less efficient permanent split capacitor (PSC) motor to comply with that trial standard level. TSL-3 through TSL – 6 contemplated that a furnace fan manufacturer would use a more efficient ECM to comply with those trial standard levels. See Table IV.9, 79 FR at 38159 (constant-torque BPM was associated with TSL-3 and TSL-4 and constant airflow BPM was associated with TSL-5 and TSL-6). DOE selected Trial Standard Level 4 (TSL-4), which corresponded with constant-torque brushless permanent magnet motor technology. 79 FR at 38201.

Not every ECM guarantees that a furnace fan will comply with the FER in the Final Rule. Similarly, there may be certain fan designs that will permit a furnace fan manufacturer to meet the FER with a PSC motor in some cases. It is fair to say, however, that a furnace fan manufacturer will likely select an ECM to meet the FER requirement in the vast majority of applications for their own economic reasons.

The remedy to the statutory conundrum here is that if the outcome of the AHRI Petition is to meet the statutory requirements of EPCA, the component of the AHRI AFUE-2 metric related to electricity use must achieve this same outcome that FER requires under the Furnace Fan Final Rule. If it does not, then backsliding occurs in violation of 42 U.S.C. §6295(o)(1).

mechanism to more precisely control the magnetic fields in order to minimize the eddy currents and losses used by traditional mechanically commutated motors. This permits a brushless motor to be able to be used, thus reducing points of physical contact within the moving components of the motor. Compare brushed motors discussed at note 6, infra.

6 Permanent split capacitor (PSC) motors use a capacitor in one of the windings to increase the current lag between the two windings to make the rotor turn. One winding is typically referred to a start winding and the other is often referred to as a run winding. These two windings are used in conjunction with a capacitor to help provide more starting torque and it also helps correct the power factor of the motor. In both technologies, there are varying degrees if inefficiencies because of the way the magnetic fields are created/controlled through their coils. There is a physical counter force created by magnetic fields on their own coils. These are due to eddy currents and they increase the inefficiency in the motors.

7 TSL-6 also required a costly backward inclined impeller and a premium constant-airflow brushless permanent magnet motor. See 79 FR at 38189 (“DOE anticipates very high capital conversion costs at TSL 6 because manufacturers would need to make significant changes to their manufacturing equipment and production processes in order to accommodate the use of backward inclined impellers.”). DOE rejected TSL-6 in part for this reason.

8 NEMA also notes that in the future it is possible that other advanced motor technologies might be adapted for furnace fan compliance in the future. ECM is the current technology candidate. For a discussion of some other advanced motor technologies, see DOE, Energy Savings Potential and Opportunities for High-Efficiency Electric Motors in Residential and Commercial Equipment §2.4 at 11-17 (2013).
For example, the proposed “AFUE2” algorithm applicable to a single-stage furnace is formulated as follows:

\[
AFUE2 = \frac{UH + 3.412 \left( y \times Benefit\; HH + Benefit\; C + Benefit\; Circ \right)}{FC + 3.412 \left( FEC\; heat + FEC\; C + FEC\; Circ + SBE \right)} \tag{1}
\]

The current FER metric is as follows:

\[
FER = \frac{(CH \times E\; max) + (HH \times E\; heat) + (CCH \times E\; circ)}{(CH + 830 + CCH) \times Q\; max \times 1000} \tag{2}
\]

Included in the proposed AFUE2 algorithm is a component meant to compute electrical energy savings. To avoid the anti-backsliding problem, the electrical energy savings component of the AFUE2 algorithm must produce the same separate electrical energy savings outcome as FER does. The proposed algorithm does not do that.

The portion of the proposed AFUE2 algorithm highlighted in yellow represents the electrical portion of the AFUE2 calculation. The electrical portion of the proposed formulation converts to a BTU measurement the usable airflow electric energy benefit and divides it by the BTU equivalent of furnace electrical consumption in watt hours. If the proposed electrical portion of the AFUE2 algorithm avoids backsliding, as the law requires, what we would expect is:

\[
(y \times Benefit\; HH + Benefit\; C + Benefit\; Circ) \geq FER \tag{3}
\]

\[
(FEC\; heat + FEC\; C + FEC\; Circ + SBE)
\]

The only way to assure that backsliding is avoided is to separate the fuel portion of the AFUE2 algorithm from the electrical portion of the AFUE2 algorithm so that conceptually ---

\[
AFUE2 = \frac{UH + 3.412 \left( y \times Benefit\; HH + Benefit\; C + Benefit\; Circ \right)}{FC + 3.412 \left( FEC\; heat + FEC\; C + FEC\; Circ + SBE \right)} \tag{4}
\]

Where \( y \times Benefit\; HH + Benefit\; C + Benefit\; Circ \) \geq FER

(FEC\; heat + FEC\; C + FEC\; Circ + SBE)

FER is described in terms of (Watts * hrs.) / (Watts *hrs.) and AFUE2 is described in terms of (BTU/hr.) / (BTU/hr.). BTU/hr. = Watts * 3.41, so energy-wise the two formulas are speaking to the same point with one exception: their treatment of operating hours. FER uses hours of use based on DOE analysis; AFUE2 uses ASHRAE historical BOH (Burner operating hours) for heating and ARI 210 H_C (hours used for SEER calculations) for cooling. The 1000

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9 The discussion that follows here would have to be applied to the AHRI algorithms for two-stage and step modulating furnaces as well.

10 The fuel (gas, oil, etc) portion of the AFUE2 metric is represented by UH (usable heat) divided by FC (fuel consumption for gas or oil).

11 This is so because the proposed AFUE algorithm takes the form of A+B/C+D, and we know that this is not the same as A/C + B/D, where A is the usable heat, B is the BTU equivalent of useable airflow electric energy benefit, C is the fuel consumption, and D is the is the BTU equivalent of furnace electrical consumption in watt hours.
constant in the FER calculation is an attempt to put the FER metric in terms of watts/1000cfm, which DOE asserts is consistent with industry practice. But if these can be reconciled in a manner that fits within the concept outlined in (4) above, then the AHRI proposal could potentially move forward. The AFUE2 algorithm cannot move forward as presented in the Petition.

As proposed by AHRI, the AFUE2 algorithm permits the electrical portion of the algorithm to be compromised by increased energy efficiency on the fuel portion of the algorithm. The algorithm implicitly sanctions a tradeoff. Under EPCA, this would only work if Congress legislated a combined energy approach to furnace regulation, but as the discussion above reveals, Congress legislated exactly the opposite approach by requiring DOE to regulate furnace electricity consumption separate from furnace fuel consumption. The anti-backsliding provision will not permit the tradeoff implicit in (1) above.

On the other hand, the concept behind the algorithm at (4) still has merit from a regulatory burden perspective under EPCA. To avoid backsliding, the AFUE2 equation requires two separate “division algorithms”\(^\text{12}\) (instead of one) on the right side of the equation along the lines of (4), where the division algorithm relating to electricity is greater than or equal to FER. On a going-forward basis, a single or consolidated furnace rulemaking could focus on what is labeled AFUE2 as described in (4) and DOE could determine that additional maximum energy savings, assuming arguendo that such savings is technologically feasible and economically justified, is achieved only by adjusting UH/FC without change in the electrical division algorithm of the AFUE2 algorithm or vice-versa or both. It may be that the cost associated with adjusting the fuel component and the electrical component of the algorithm (4) at the same time cannot be economically justified or that incremental energy savings from adjusting the electrical component in the future is not significant. Consolidating the rulemakings reduces the number of furnace-related rulemakings (a benefit for both DOE and the public); it also reduces the burden on manufacturers associated with having to comply sequentially with multiple standards changes over a period of time, and it achieves the benefit of having a single metric for energy purposes.\(^\text{13}\)

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\(^\text{12}\) A division algorithm is an algorithm which, given two integers N and D, computes their quotient and/or remainder. The AHRI proposal displays only one division algorithm of the form N/D. EPCA’s separate regulatory requirements for (1) furnace fuel and (2) electricity to power furnace fans requires a division algorithm for fuel and a separate division algorithm for electricity: N_1/D_1 + N_2/D_2, where N_2/D_2 \geq\text{FER}.

\(^\text{13}\) For instance, DOE has stated in its current Process Rule, “With respect to overlapping efficiency standards on a product and components of the product, the Department will pay special attention to the cumulative regulatory burden being borne by the manufacturer of finished products containing that component. In such cases, the Department will specifically address the cost of potential component standards plus the overlapping costs of existing parallel standards on both the component and the system in which the component is installed.” 61 FR 36974, 36978 (July 15, 1996). Consolidating these rulemakings enables DOE to implement this portion of the Process Rule in the case of residential furnaces, and the concept behind algorithm (4) enables DOE to avoid the backsliding injunction in 42 USC §6295(o)(1) consistent with the structure of EPCA’s provisions dealing with furnaces and furnace fans.
III. The Furnace Fan Enforcement Policy Statement must be rescinded.

As discussed above, the structure of EPCA’s distinct statutory provisions relating to residential furnaces and the statutory anti-backsliding provision in EPCA are formidable barriers to the adoption of the AHRI proposed AFUE2 algorithm (1).

Manufacturers of motors have invested tens of millions of dollars to increase capacity and delivery of ECM motors by July 3, 2019 in reliance onto comply with the Furnace Fan Rule that was adopted 4.5 years ago. This was an issue raised during the Furnace Fan rulemaking, and motor manufacturers told DOE that they would be ramping up capacity to meet increased demand. See 79 FR at 38154 (“Motor manufacturers also supported DOE’s assumption that after implementation of furnace fan efficiency standards, brushless permanent magnet motor technologies will become increasingly available over time.”). They have done so. Furnace fan manufacturers have made investment decisions too in reliance on the DOE Furnace Fan Rule. DOE should not, at the 11th Hour, be in the business of stranding or undermining investment decisions of persons who have relied on DOE’s prior ostensibly final judgments. As one court has previously said, it “undermines any sense of certainty on the part of manufacturers.” See NRDC v. Abraham, supra at 197.

DOE’s “non-enforcement statement” is already being interpreted as an extension of the time to comply with the Furnace Fan Rule --- an extension of the compliance date that warrants a delay in ordering ECM motors or otherwise redesign furnace fans because of a belief that they will not be required by July 3, 2019. DOE cannot extend the compliance date of a Final Rule’s energy conservation standard without Notice and Comment rulemaking under the Administrative Procedure Act. NRDC v. Abraham, id. (“Further, such a result would completely undermine any sense of certainty on the part of manufacturers as to the required energy efficiency standards at a given time. . . . Finally, and most importantly, such a reading would effectively render section 325(o)(1)’s ‘antibacksliding’ mechanism inoperative, or a nullity, in these circumstances.”).

CONCLUSIONS

For the reasons stated above, DOE should deny the petition on the terms proposed for AFUE2 by AHRI in its Petition. Both the structure of EPCA’s separate statutory clauses applicable to residential furnaces and furnace fans and the anti-backsliding provision require a different approach than proposed by AHRI. NEMA recommends that DOE entertain a future petition in connection with its Residential Furnace rulemaking that preserves and will not compromise the FER metric from the Furnace Fan Final Rule and promises a reduction in multiple rulemakings and regulatory burden for the manufacturers of Residential Furnaces.

DOE should also rescind and withdraw the November 2, 2018 Enforcement Statement immediately.