

Web-Based Product Noise Declarations

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This article covers a proposed program for making standardized noise declarations for both industrial and consumer products. The proposal is aimed at the information technology industry in particular but is generally applicable to all industry groups.

Since the publication in the mid-1980s of ISO 7574 "Statistical Methods for Determining and Verifying Stated Noise Emission Values of Machinery and Equipment," steady progress has been made towards providing consumers with meaningful product noise declarations. ISO 4871 "Declaration and Verification of Noise Emission Values of Machinery and Equipment" was issued soon thereafter and translated the general provisions and technical statistics of ISO 7574 into a practical, usable method for products. The Information Technology (IT) industry became one of the first industry groups or trade associations to specialize the requirements of ISO 7574 to its own family of products. It published ISO 9296 in 1988, which tailored the declaration and verification provisions of ISO 7574 to IT product noise declarations. The primary consensus descriptor in these standards is the "declared A-weighted sound power level," L_{WAAd} . One of the authors recently presented a proposal for an industry group program that could facilitate the widespread use of product noise declarations, thus enabling consumers to make informed purchasing decisions regarding the noisiness of the products they are considering. That proposal laid the framework for organizing the industry group's Acoustics Committee and offered suggestions for dealing with the many logistical issues that would undoubtedly arise in managing such a volunteer program among competing companies. One key element of that proposal was the use of the worldwide web for publishing the noise declarations themselves. This article describes how web-based noise declarations might be implemented, and discusses some of the benefits of this approach. The discussion and examples are particularly geared to the IT industry, but the concepts and rationales are general enough to be applied to any industry, from consumer products to high-tech medical equipment.

Background

In 1985, a standard was published that was to have far-reaching consequences for consumers: ISO 7574, Statistical Methods for Determining and Verifying Stated Noise Emission Values of Machinery and Equipment.¹ For the first time, consumers and other purchasers would be able to get noise emission information for the products they buy just as they were able to get nutritional information on food, power usage information on electrical appliances, or gas mileage information on cars. ISO 7574 was published in four parts and promulgated the benefits of declaring noise emission values while describing, in great mathematical detail, the statistical methods needed for determining and verifying the declared value. In an attempt to make the statistical requirements of ISO 7574 a bit more tractable for the manufacturers who make the declarations, ISO 4871, Declaration and Verification of Noise Emission Values of Machinery and Equipment was drafted.² It con-

dened the information in ISO 7574 and assigned a value to the so-called reference standard deviation. The "statistical upper limit A-weighted sound power level" (in decibels) was the preferred quantity and was given the symbol L_{WAAd} for "declared sound power level" (and informally pronounced 'el-wahd'). In addition, a simplified procedure for verifying the declared value was specified based on a random sample of three machines. Presumably, the presence of the latter would help guarantee that the declared values would be accurate and honest and thus afford a level playing field for the consumer.

While it is true that in the two decades since its original publication ISO 4871 has been referenced extensively in national and international standards, industry test codes, and European Directives, it is safe to say that the original promise of ISO 7574 has not yet been realized. Most noise-emitting products on the market today are still being bought and sold without any noise emission information being made available to the potential purchaser. Consumers cannot walk into a Home Depot or Sears and easily find and compare the noise levels of the Toro® vs. the Weed Eater® weed wacker. They cannot sit down with their kitchen design contractor and confidently base their selection of the dishwasher, refrigerator or garbage disposal on the lower-noise offerings (or, in any event, balance noise versus price).

Product manufacturers today, as a matter of course, are determining the noise emission levels of their products, either in their own acoustics labs or through outside testing services. They are using the resulting data to ensure that their products meet specifications. They are using the data to drive engineering modifications to improve the product quality. Why are they not providing this information to the public?

To be fair, there has been some success in making product noise declarations. Consumers can actually compare bathroom exhaust fans from a noise level standpoint, thanks to the efforts of the Home Ventilating Institute (HVI). HVI member companies agreed among themselves that they would be required to label the noise emission level (in sones) of bathroom fans, range hoods, and other home ventilators when measured according to a uniform, standardized test procedure that they developed. In 1988, the Information Technology (IT) industry became the first to specialize the requirements of ISO 7574 and ISO 4871 to its own products, by drafting ISO 9296, Acoustics-Declared Noise Emission Values of Computer and Business Equipment.³ Based on the measurement test codes of the IT industry and the particular family of products common to the industry, a standard deviation of reproducibility and a reference standard deviation were defined and incorporated into the standard. The IT industry has had good success with its ISO 9296 standard on at least two fronts – (1) there is virtually unanimous support for it within the IT industry, and (2) many standards, regulations, environmental labeling documents, and company specifications refer to its requirements and procedures for declaring and verifying IT product noise emission levels. Yet in terms of the availability and accessibility of actual noise declarations for IT products, the IT industry has not had all that much success. This for an industry with its own fully-endorsed international standard giving them all the reasons for declaring, and prescribing exactly how to go about doing so. Why? The authors feel that the answer to this question, as well as the above question relating to manufacturers

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in general, may have nothing to do with economics or business strategy, but instead with the way manufacturers think about how to present the noise declarations to the public. If their general mindset remains that of the mid-1980s when the idea of noise declarations first appeared with ISO 7574, i.e., print-based noise declarations and all the logistical problems that come with communicating between acoustics labs and corporate publications departments, it is no wonder that published noise declarations are hard to find.

A New Proposal

A recent paper by one of the authors⁴ presented a proposal for how an industry group or trade association might go about instituting and organizing a formal noise declaration program among its member companies. The paper discussed some of the reasons why acoustical noise declarations are still relatively unfamiliar among the general public, as well as the current noise declaration standards and the so-called eco-label documents. It indicated why the L_{WAd} metric is the preferred descriptor, highlighted the work of ANSI S12, Working Group 38, that is drafting an American version of ISO 4871, described the content that should go into a proper noise declaration, and laid out in detail the framework of the proposed industry group program for making acoustical noise declarations. The reader is referred to that paper for a more complete background and perspective on the product noise declaration issue in general. This article is more narrow in scope, and is intended to illustrate how a noise declaration might be implemented on the web, and to discuss some of the accompanying benefits. The following two distinctions might be helpful in providing a perspective for the discussion to follow.

Declaration vs. Verification. As mentioned, the three ISO standards not only provide guidelines and requirements for determining the values to be declared and for presenting the declared values themselves, but they also specify the procedures to be followed for verifying that the declared values are met for a particular product. This article is only concerned with the former aspect, i.e., declaring the noise emission levels of a product. Use of the worldwide web can greatly facilitate meeting ISO requirements for declaring noise emission values, but the web, by itself, cannot help with the verification requirements, as these involve making controlled measurements on actual products, in special laboratories, using specialized instrumentation.

Declaration vs. Labeling. We must differentiate between the product noise information that a company may publish on their web site, in sales literature or in user manuals, and the noise information that would be affixed to the product via a physical label. The declaration standards mentioned above do not require or even suggest the use of physical labels on products; they simply prescribe the information that should be made available to the public and its format. Physical labels are common in some industries – examples are nutritional labels on foods, energy labels on appliances, and gas mileage labels on automobiles – but for noise emission levels, there may be reasons why actual labels on products would not be necessary or appropriate. For the IT industry, in particular, physical labels are not likely to be used on products such as computers, data storage units, and imaging products, for at least two reasons. First, for physically large IT equipment (generally high-end products), the client or customer usually is making purchasing decisions without the actual product in front of them. They are typically perusing published information (electronic or hard-copy) on their own or with a company salesperson, and a physical label on such a product would have little benefit. Second, for smaller IT products such as personal computers or laptops, their limited size itself does not usually allow affixing a label that contains all of the required ISO 9296 information, let alone the optional information. Product noise labels may be well suited for products that consumers typically shop for in the aisles of stores, such as vacuum cleaners, hair dryers, and power tools. But, published noise declarations are gen-

erally more meaningful for IT industry products. In any event, this article will discuss noise declarations, not noise labels.

The Content of a Noise Declaration

The Metrics to Declare. There is no shortage of available metrics and descriptors to describe the noise emission of a product: A-weighted sound power level, A-weighted sound pressure level, C-weighted levels, octave- or one-third octave-band sound power or sound pressure levels, calculated sound exposure metrics, various “noisiness” metrics, and a wide range of “Sound Quality” metrics. The debate has been waged for many years as to which ones more accurately gauge human responses to noise and which ones should be presented to the public in declarations or labels. Surely there are specific advantages in specific situations of one metric over another, but just as surely we cannot include all the metrics or even a sizable subset in a noise declaration without defeating the purpose of providing consumers with a simple, meaningful way to compare the noise levels of one product to another. The goal is to arrive at one or two descriptors that in the vast majority of cases will adequately allow a consumer to know that Product A is noisier than Product B, and to have some idea of how much noisier.

The debate will undoubtedly rage on, but it is the authors' position that the A-weighted sound power level L_{WA} specifically the declared A-weighted sound power level L_{WAd} perhaps supplemented by the A-weighted emission sound pressure level L_{pA} at a specified position or positions, best satisfies this goal and should be used as the metric of choice in noise declarations and on labels. A product with a higher L_{WAd} will generally sound noisier than a product with a lower L_{WAd} , more so when the difference is large and less so when the difference is small. Furthermore, the sound power level of a product is usually required when predicting or estimating installation noise levels (factories, data centers, offices, classrooms, or living rooms) and is a key input parameter to commercially available software packages that do this. Finally, a strong *de facto* case can be made for using L_{WAd} based on the fact that this quantity has already been in use for noise declarations for nearly 20 years. Through the use of ISO 7574, ISO 4871, and ISO 9296, much information and education have already been disseminated on the use and meaning of L_{WAd} ; many product noise declarations have been made using it; and a good number of regulations and purchase specifications have been written in terms of it.

The Information Technology industry has already decided on the use of L_{WAd} (and L_{pA}), so this recommendation is aimed at other industry groups for their noise declaration programs. The advantages of having a uniform descriptor like L_{WAd} across all industries and product groups cannot be overestimated in terms of the benefits to the consumer. Still, in certain cases a particular industry may elect a different metric for its particular product family if it can be shown to be more appropriate. Consumers are comparing one bathroom fan to another bathroom fan and not a bathroom fan to a desktop computer, so here the use of sones, for instance, (which the HVI industry has decided upon) may not pose any problems.

Range-of-Levels Information. In addition to the declared noise emission level of the product itself, it is important to provide some indication of the typical range of noise emission levels for this type of product. Surprisingly, this kind of information is not required or even listed as optional in any of the standards or documents referred to earlier – it is not even mentioned. Even if we are eventually successful in having all manufacturers declaring the noise levels of all of their products, the potential buyer might still say “So what?” when viewing a noise declaration or label for a refrigerator that says “ $L_{WAd} = 62$ dB.” “Is this a noisy refrigerator or a quiet refrigerator?” Granted, if there are 20 other refrigerators lined up in the aisle, the consumer could spend some time comparing these and answering the question, but what if he or she is looking at the noise declaration on-line, or in a catalog? Including a statement

about the range of levels of similar products in the product noise declaration will greatly help consumers make informed purchasing decisions *vis a vis* noise. Compiling the information needed for these range-of-levels declarations will, of course, take some time and may require unprecedented cooperation among companies who are otherwise competitors.⁴

Use of the Worldwide Web for Noise Declarations

Why the Web? Why *not* the web? Today, it is assumed, even expected, that if you are shopping for information – any kind of information – the place to start is the worldwide web. Internet search engines are remarkably fast and extremely easy to use. Virtually everyone with access to a computer and the internet, regardless of their level of technical sophistication, can use the web to find particular information. Of course, a large segment of the population still does not have access to computers, so web-based noise declarations may not be the optimal way to get information to potential purchasers of certain types of products. But for most products, and especially for Information Technology products, we can make the tacit assumption that potential buyers have familiarity with computers and the internet, and would most likely consider the web as their primary source of product information, including acoustical noise declarations.

While the web may be the best way for manufacturers and suppliers to declare the noise levels of their products, it need not be the only way. Printed versions of product noise declarations can still appear in hard-copy user's manuals, installation guides, sales literature, etc., but there are problems with these formats, as will be discussed below. For certain types of consumer products such as vacuum cleaners, household appliances, power tools, etc., where the typical purchaser makes a deliberate trip to a local store to shop around, or where some purchasers might not have access to the internet, traditional hard-copy noise declarations or physical labels may, in fact, be the best approach. But even in these cases, the manufacturers of the products can provide a great benefit to consumers in general by also including product noise declarations on their websites.

Problems with Print-Based Noise Declarations

In the mid-1980s, when ISO 7574, ISO 4871, and the IT industry's ISO 9296 were being developed, the worldwide web was a distant thought, at best. Very few people were even using the internet, and if they were, it was for communication rather than for presenting and managing information. The working group members drafting these standards were thinking in terms of presenting noise declarations in some form of hard copy. The key requirement is stated in ISO 9296 as "Declared noise emission values shall be given in technical documents or other literature supplied to the user." It was quickly realized that this was much easier said than done, as outlined in the following reasons. Although these are presented in terms of the Information Technology industry and its family of products, the arguments and conclusions apply to other industries as well.

1. Getting the Information to the Purchaser. Assuming that all of the acoustical information is available, and that the manufacturer or declarer has prepared a noise declaration that meets all the requirements of ISO 9296 for format and completeness, the decision then has to be made as to where the declaration is to be published. Most IT companies market a wide range of products, each with a wide range of accompanying documentation, usually all in different formats. For large systems, there are installation planning guides, service guides, and technical reference manuals; for smaller IT products there are user's manuals, brochures, and spec sheets. Furthermore, there are the many Sales and Marketing documents that are available to potential customers before they purchase the product. For a given product from a major IT company, there may be dozens of documents "supplied to the user." Where should the acoustical noise declaration be published? If you were a user or po-

tential purchaser, where would you look for the noise declaration? This is not an easy decision for IT companies to make, and there is no guidance from the ISO 9296 standard. When a particular IT company finally makes a decision on where to publish its noise declarations, another IT company may have totally different ideas. Therefore, even in the ideal world where all the IT companies were faithfully publishing acoustical noise declarations, the consumer would still be faced with a daunting task of finding them.

2. Getting the Information from the Acoustics Lab to the Publication Department. Of course, before we even can think about publishing the noise declaration for a product, the product's noise emissions have to be measured and analyzed, and the value of the declared A-weighted sound power level has to be properly determined, along with the mean A-weighted sound pressure level, information on discrete tones or impulsive noise, and other acoustical information that may be declared. All of this is clearly specified in ISO 9296 and other test codes for the IT industry,⁴ and for most IT companies, these measurements and analyses are conducted in their acoustics laboratories by trained technical specialists. For some smaller companies, the acoustical testing may be performed externally. In any event, the acquisition of the data and the preparation of the noise declaration is done by acoustical specialists, but it then has to be delivered to personnel in the company's Publications Department, or equivalent, who are usually not familiar with its technical meaning or its importance. Once the noise declaration is sent on its way from the acoustics lab, the acoustical specialist is usually out of the loop, and has little further involvement before the data wind up in one or more printed publications.

There are three other complicating factors: (i) For printed publications, the information must be collected many months in advance, sometimes even before the product has gone through its final acoustical compliance testing; (ii) it is likely that different teams handle the publications for different product lines, and some of these teams may be located in different company sites across the country (or even in different countries); and (iii) there is more likely to be personnel turnover from year to year in the company's publications departments than in the acoustics labs. All three of these increase the chances that the data prepared by the Acoustics Lab may not be complete or final, may not make it successfully to the intended publication, or may be corrupted in some form along the way.

3. Ensuring that the Published Information Supplied to Customers is Correct. In truth, the only individuals who can ensure that the published data are correct are the company's acoustical specialists. Given the nature of the standardized acoustical measurements that are required, it is safe to assume that the resulting data are filed in the acoustics lab itself, or otherwise under the control of the acoustical specialist assigned to the particular product. If the specialist were shown the printed declaration that was being supplied to the purchaser, he or she could readily determine whether or not it was correct. The problem is that the acoustical specialists rarely see the final print documents. It would be a nearly impossible task to screen the many varied documents for the many products offered for sale by today's IT companies (and likewise for other major companies in other product lines).

4. Correcting or Updating Published Noise Declarations. What if the acoustical specialist discovered that, in fact, one of the printed publications had incorrect L_{WAd} values? Or, what if updated values are now available, or a newer release of the product has different values to declare? Given the long lead times for print documentation or the many players involved in the process, the odds that the information would be changed once it is published are, unfortunately, quite small.

Perhaps some IT companies have simply decided that the risks of possibly publishing incorrect or down-level noise declarations are not worth the potential benefits of the declarations themselves. Or, the efforts involved in overcoming all

of the obstacles and guaranteeing valid declarations are not worth the costs. To be sure, since the publication of ISO 9296, several IT companies have been attempting to meet its declaration requirements with good faith, but the success rate is much lower than it should be. Undoubtedly, this is true in other industries also. The good news is that the IT industry (and others) can easily avoid all of the above problems by adopting the web as the primary mechanism to supply product noise declarations to consumers and customers.

The Advantages of Web-Based Noise Declarations

Despite today's universal reliance on the worldwide web, one would be hard pressed to find many examples of web-based product noise declarations. Not only is this the case for the IT industry, which has had its ISO 9296 noise declaration standard since 1988, but also for all other industries that produce noisemaking equipment and machinery, which have had ISO 4871 since 1984. Regardless of the reasons, if product development companies were more aware of the benefits of web-based noise declarations, and the relative ease with which they can be implemented, it is likely they would enthusiastically begin publishing noise declarations for all of their products, to the ultimate benefit of their customers.

It may be useful before proceeding to identify a distinction between an "on-line publication" and a "web-based noise declaration," at least for the purposes of this article. The most well-known of the former category are PDF files (from Adobe Systems), but other electronic documents, formatted using widely available word-processing packages, are also included in this category. A few IT companies do provide on-line product publications (generally PDFs) that contain product noise declarations along with other product information. Generally, on-line publications need to be 'launched' by an appropriate application before they can be read. In some regards they are similar to the print-based documents discussed above, only in electronic form, with many similar problems. Contrasted to these, a web-based noise declaration is one that appears on the web page directly, one that is marked up using standard html and thus 'opened' by the browser itself. The following advantages of web-based noise declarations apply specifically to this type of noise declaration and not the type that might appear in an "on-line publication."

1. It Is Easy to Get the Information to the Customer or Purchaser. The problem of deciding in which of many documents to publish the noise declaration for a new product simply disappears. There is now only a single place – the web page for the product. In reality, there would be only a single formatted noise declaration for a particular product, and the link to this declaration would be located on the product web page (see below for more details). Customers or potential customers wanting noise information for a particular product would no longer need to page through various brochures or documents, or attempt to call customer service. Their first thought would be to go to the company's website, find the product they are looking for, and either find a link for "acoustical noise declaration" (preferred) or enter a few search words to pull it up (a viable alternative). An added benefit here would be that not only customers but employees of the company itself could access the noise declaration just as easily.

2. The Information from the Acoustics Lab Easily Gets to the Right Place. The acoustical specialists no longer would have to depend on a constantly-changing and widely-dispersed group of publications department personnel to process the product noise declarations and to insert them into the proper publication correctly. In all probability, there will be a single point of contact within the company for the web-based declaration because there will only be a single 'document' that is linked and displayed. The properly formatted ISO 9296 noise declaration would go directly from the acoustical specialist to this single point of contact. The specialist can remain "in the loop" by simply checking the website to see if the noise declaration made it to its destination.

3. It Is Easy to Ensure that the Published Information Supplied to Customers Is Correct. The acoustical specialist responsible for the particular product merely has to visit the product web page and inspect the noise declaration. He or she can do this on their own, at any time. There is no need to maintain a database of key company contacts in the publications department, or to implement a complex quality control process of periodically acquiring and inspecting the many print publications that are supplied to purchasers. In fact, the various groups within the company working on the various hard-copy print publications can now, themselves, access the single product noise declaration on the website to obtain the information they need. This way, even though there may be dozens of different print documents that go out with a new product, they will all have the correct noise declaration. One recommended change that can be made to all of these, however, is to include a few words in the printed noise declaration directing the reader to the appropriate website for any updates. This way, the acoustical specialist need only inspect the website to be confident that everyone is getting the correct information. (Note: Another possible approach is to simply eliminate all printed noise declarations and replace them with URL references to the web-based declarations; but as this would require all potential customers to have ready access to the web, such an approach might prudently be put off for a few more years.)

4. It Is Easy to Correct or Update the Published Noise Declaration. If the acoustical specialist discovers that the published noise declaration is incorrect on the company's website, it is a simple matter of contacting one person to change it, in nearly real time. If updated acoustical information has become available, or if the product has been released with a different configuration such that the noise emission levels have changed, the numbers in the noise declaration can easily be changed to reflect this. Moreover, "additional information" can be added to the noise declaration at any time. In these regards, the web-based noise declaration becomes a dynamic source of information, not possible with print-based publications or physical labels.

5. The Acoustics Lab Personnel Can Maintain Control Over the Acoustical Data that Are Declared. Since the acoustical data for the product noise declaration originate from measurements conducted in the company's acoustics lab (or sent there from an outside test house in certain cases), it makes sense from a quality control point of view that these data should remain under the control of the acoustical specialists. Databases or spreadsheets containing the raw acoustical data ideally should reside in a single repository in the acoustics lab rather than being distributed around the company to various departments for the purposes of preparing noise declarations. The web-based noise declaration can facilitate this quality control approach. There can and should be a one-to-one linkage between the values presented in the noise declaration and the values stored in the database maintained by the Acoustics Lab. The implementation of this linkage can range anywhere from a manual process, where the acoustical specialist would simply transmit the data to the web page owner or designer when appropriate, to a sophisticated process that automatically links fields in the noise declaration table on the web page to corresponding fields in the database controlled by the acoustical specialist. When the acoustical specialist updates a value, it is changed instantly for potential customers worldwide.

Examples of a Web-Based Product Noise Declaration

A previous paper described in detail the actual content of a product noise declaration both in terms of the information that is required by the standards and the information that is optional but helpful to the consumer or purchaser.⁴ Figures 1-4 illustrate how product noise declarations might be presented on a typical IT company's website. Shown are images of web pages that a potential customer might visit in the course of locating information on the noise emission levels of a certain product. Of course, the format and style of the web pages and the noise

declaration can vary widely from one company to another – the images shown are obviously from the authors' company and in its presentation style – but essential information would most likely be similar within the IT industry due to the similarity of products and the existence of the ISO 9296 standard. The complete product noise declaration should include the following four elements.

The “First Link” Page. The primary goal of the web-based approach is to make the noise declaration easy to find. A key element of the program, therefore, would be an explicit link with words such as the “acoustical noise declaration” somewhere on the product information page. Such a link will not only be easily targeted by a search engine, but will also take the visitor directly to the noise declaration itself. Besides the clear advantage over paging through a hard-copy print document, such an explicit link also offers an advantage over having to open an on-line publication and searching within it to find the noise declaration. Although not illustrated, this “first link” appears explicitly on the product web page for the “IBM p690 Enterprise Server” and when clicked takes the visitor directly to the web page shown in Figure 1. The user, of course, may have had to navigate through several preliminary web pages to arrive at the product page, but once the user arrives at that page the noise declaration link should either appear there directly or at least “one or two clicks” away. A noise declaration applies to a specific product; regardless of how long it takes to find the specific product, finding the associated noise declaration should require minimal additional effort.

The Primary Noise Declaration Page. Figure 1 shows an example of a product noise declaration. It is marked up in standard html and thus displayed directly by the browser, with no need to open another document. The declaration is presented in full conformance with ISO 9296 and presents, among other information, the declared A-weighted sound power level L_{WAd} and the mean A-weighted sound pressure level at the bystander positions L_{pAm} for both the operating and idling modes of operation (which, for this particular product are the same). Note

The screenshot shows the IBM website's product page for the pSeries 690 Enterprise Server. The main heading is "Acoustical Noise Declaration for pSeries 690 Enterprise Server". Below this, there is a table titled "Declared Noise Emissions in Accordance with ISO 9296". The table has columns for Product Description, Declared A-Weighted Sound Power Level, L_{WAd} (B), and Declared A-Weighted Sound Pressure Level, L_{pAm} (dB). The data is as follows:

Product Description	Declared A-Weighted Sound Power Level, L_{WAd} (B)		Declared A-Weighted Sound Pressure Level, L_{pAm} (dB)	
	Operating	Idling	Operating	Idling
IBM eServer® p690 Model 681 configured with one processor subsystem, one I/O drawer with 4 disk drives, bulk power subsystem, and Acoustical doors	7.5	7.5	57	57

Below the table, there are four numbered points explaining the metrics and standards used. A "More Information" link is visible on the right side of the page.

Figure 1. Primary noise declaration page for a high-end server, which should contain all of the information required by ISO 9296 declared in full conformance with that standard. Information listed as “optional” in ISO 9296, or that might be useful to customers or prospective purchasers, should be included on a separate page with a link clearly visible on the primary page. The “More Information . . .” link at right in the example above will take the visitor directly to the page shown in Figure 2.

The screenshot shows the "More Information" page for the pSeries 690 Enterprise Server. It includes a table with additional noise data and explanatory text.

Product Description	Declared A-Weighted Sound Power Level, L_{WAd} (B)		Declared A-Weighted Sound Pressure Level, L_{pAm} (dB)	
	Operating	Idling	Operating	Idling
IBM eServer® p690 Model 681 configured with one processor subsystem, one I/O drawer with 4 disk drives, bulk power subsystem, and Acoustical doors	7.5	7.5	57	57
Same as above but with Slimline (non-acoustical) doors	7.9	7.9	62	62

Below the table, there are four numbered points explaining the metrics and standards used. The page also includes sections for "Information on Relative Noisiness" and "Information on the Emission of Prominent Discrete Tones and Impulsive Noise".

Figure 2. Example of the “More Information” web page, which may contain declared noise levels for additional configurations of the product, information about relative noisiness or range-of-levels, or information about the character of the noise (discrete tones and impulsive noise). In some cases, one-third octave band data may also be included if appropriate.

that the particular product displayed here is a high-end, high-powered server, densely packaged in a large rack, and the declared values are comparatively high compared to smaller IT products such as workstations and personal computers. For readers familiar with Sweden's Statskontoret Technical Standard 26:5,⁵ the *de facto* standard in the IT industry specifying noise emission limits, this type of product would be classified as a “Category 1” product generally intended for “Data Processing Areas.” The noise limits specified in the latter are in terms of the same metric used for declaration according to the ISO 9296 standard, namely, the declared A-weighted sound power level, so a prospective IT customer could immediately see on this web page whether or not the declared values meet the Statskontoret requirements (for the example product shown in Figure 1, they do).

Figure 3 shows the primary noise declaration page for a deskside entry-level server. This product would be classified as a “Category 2” product in Statskontoret 26:5, intended for “General Business Areas.” As this is a more noise-sensitive area than the data processing area, the 26:5 noise limits are lower, and the noise levels declared for this product are quite a bit lower than those of the large enterprise server in Figure 1. Declarations for smaller desktop workstations or personal computers would look similar only with even lower values, as these would be

classified as “Category 3” products intended for “Quiet Office Areas.” This type of environment has the highest noise sensitivity and the most stringent noise limits in the current Statskontoret 26:5 standard.

This primary declaration page displays all the information that is required by ISO 9296. Essentially, this is the minimum information that has to be declared (usually a typical configuration of the product). Often, however, there is more information available about the noise emissions of the particular product that could be helpful to the potential customer. Instead of including all of this optional information on the primary noise

declaration page, the authors recommend adding an additional link here with words such as “more information on the noise emissions of . . .”, as shown in Figure 1.

The “More Information” Noise Declaration Page.

Figure 2 illustrates what might be included as additional, optional information on the noise emissions of a particular product. Here, we can add one or more additional product configurations, or indicate how the noise emission levels change when various options are included with the product. For example, the prospective customer could see from this page that the noise emission levels of the p690 Server increase quite a bit when the acoustical doors are replaced with non-acoustical doors. (In this case, in fact, the product no longer meets the noise emission limits for a Category 1 product given in Statskontoret 26:5 mentioned above.) We can give information about the emission of discrete tones or impulsive noise (as discussed in ISO 9296 as an option) or we can include some helpful information about “relative noisiness” to give consumers a better feel for what the L_{WAd} numbers really mean (see discussion in Ref. 4 about relative noisiness and the efforts to include this kind of optional information in an American version of ISO 4871). Finally, we might be able to include some valuable information about the “range of levels” of similar products, as discussed above. In the particular case illustrated in Figure 2, this range of information is for similar products offered by the same company (IBM, in this case). The ultimate hope is that this kind of information will be available in the not-too-distant future in a coordinated, credible fashion from the IT industry as a whole (or from other industry groups and trade associations making product noise declarations). In any event, having the option and availability of a separate link for “more information” is a convenient way to include this information without having the primary noise declaration page appear too complex.

Figure 4 shows this same kind of more-information page for the desktside server declared in Figure 3. In this case, the user can weigh the benefits of purchasing an “acoustical attenuation kit” for this product that would provide 3-4 dB of noise reduction.

The ‘Tutorial’ Page. At least until acoustical noise declarations become commonplace and fully understood by the aver-

The screenshot shows the IBM eServer website interface. The main heading is "Acoustical Noise Declaration for pSeries 630 Model 6E4". Below this is a table titled "Declared Noise Emissions in Accordance with ISO 9296".

Product Description	Declared A-Weighted Sound Power Level, L_{WAd} (B)		Declared A-Weighted Sound Pressure Level, L_{pAm} (dB)	
	Operating	Idling	Operating	Idling
IBM eServer® pSeries® 630 Model 7028-6E4-221E Power 4+ 1.2 GHz Desktside UNIX server	6.0	5.9	42	41

Below the table is a "More information" section with a list of 5 points explaining the measurement methods and standards.

Figure 3. Example of the primary noise declaration page for a desktside server. (See comments under Figure 1.)

The screenshot shows the "More Information" page for the same product. It includes a table titled "Declared Noise Emissions in Accordance with ISO 9296" with two additional rows of data.

Product Description	Declared A-Weighted Sound Power Level, L_{WAd} (B)		Declared A-Weighted Sound Pressure Level, L_{pAm} (dB)	
	Operating	Idling	Operating	Idling
IBM eServer® pSeries® 630 Model 7028-6E4-221E Power 4+ 1.2 GHz Desktside UNIX server	6.0	5.9	42	41
IBM eServer® pSeries 630 Model 7028-6E4-221E with acoustical attenuation kit P/PRQ : BA1221 Revision 0001	5.7	5.6	38	37

Below this table is a section titled "Information on Relative Noisiness" with a table:

Actual L_{WAd} for this product	6.0
L_{WAd} for a product that would sound roughly twice as loud or twice as noisy	7.0
L_{WAd} for a product that would sound roughly half as loud or half as noisy	5.0
Typical range of L_{WAd} values for similar IBM low-end servers	5.5-6.8 B

There is also a section titled "Information on the Emission of Prominent Discrete Tones and Impulsive Noise" with two bullet points.

Figure 4. Example of the “More Information” web page for a desktside server. (See comments under Figure 2.)

age consumer, a page or two of general background information should be available. Although not illustrated here, Figure 1 shows how a link labeled “What is an acoustical noise declaration?” can be included on the primary noise declaration page to take the visitor to this background information. The tutorial page can also include links to other information on acoustics and acoustical organizations that are widely available on the internet.

Conclusions

This article suggests manufacturers move to a web-based approach for publishing noise declarations for their products, and has attempted to show the many advantages such an approach may offer over traditional print-based publications. Despite the advantages and general acceptance of the worldwide web, there are very few acoustical noise declarations on the web today, if any can be found at all. Thus, publicizing even “the obvious” might help in bringing about a more widespread use of this valuable resource. This article presents one idea on how web-based noise declarations might be implemented, using examples specific to the IT industry, though it is expected that individual companies may arrive at quite different implementations. In any event, the authors recommend that the following key elements be adhered to: (1) The “first link” to the noise declaration page should be associated with a specific product, be easy to locate, and contain key words such as “acoustical noise declaration” that facilitate electronic searching. (2) The web page that this link goes to should contain the primary noise declaration, presented in full conformance with ISO 9296 (or ISO 4871 in general) and include only the essential, required information. (3) On this primary declaration page should be an additional link to “more information,” where companies can declare as much optional information as they choose. (4) Also on the primary declaration page, an optional ‘tutorial’ link might be included to provide the visitor with background information on noise declarations in general. A web-based noise declaration approach will allow acoustical specialists to stay “in the loop” and thus ensure that the acoustical noise emission information that consumers, customers, and potential purchasers are getting is correct and up to date. With ISO 7574 and ISO 4871 already well established, and with

ISO 9296 available as a successful example of an industry-specific standard for noise declarations, taking the next step and embracing the worldwide web as the medium for presenting product noise declarations will finally give the public the information they need at their fingertips.

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