**Difference between Bootstrap 3 and 4**

Bootstrap 44 is a major rewrite of almost the entire project. The most notable changes are summarized immediately below, followed by more specific class and behavioral changes to relevant components.

1. Browser support
   1. Dropped ie8, ie9 and iOS 6 support. V4 is now only IE10+ and iOS7+. For sites needing either of those, use v3.
2. Global changes
   1. Flexbox is enabled by default. In general this means a move away from floats and more across our components.
   2. Switched from LESS to SASS for our source CSS file.
   3. Switched from “px” to “rem” as our primary CSS unit, though pixels are still used for media queries and grid behavior as viewports are not affected by type size.
   4. Global font-size increased from “14px” to “16px”.
   5. Added new grid tier for smaller device at “576px” and below (our new “xs” tier).
   6. Replaced the separate optional theme with configurable options via SCSS variables (e.g. “$enable-gradients: true”)
3. Grid system
   1. Added support for flexbox in the grid mixins and predefined classes.
   2. As part of flexbox, included support for vertical and horizontal alignment classes.
   3. Overhauled grid mixins to merge “make-col-span” into “make-col” for a singular mixin.
   4. Added a new “sm” grid tier below “768px” for mew granular control. We now have **xs, sm, md, lg** and **XL.** This also means every tier has been bumped up one level (so .col-md-6 in v3 is now .col-lg-6 in v4).
   5. Changed grid system media query breakpoints and container widths to account for new grid tier and ensure columns are evenly divisible by 12 at their max width.
   6. Grid breakpoints and container widths are now handled via SASS maps ($grid-breakpoints and $container-max-widths) instead of a handful of separate variables. These replace the “#screen-\*” variables entirely and allow you to fully customize the grid tiers.
   7. Media queries have also changed. Instead of repeating our media query declarations with the same value each time, we now have “@include media-breakpoint-up/down/only”. Now, instead of writing @media (min-width: @screen-sm-min) {…}, you can write @include media-breakpoint-up(sm) {…}.
4. Components
   1. Dropped panels, thumbnails, and wells for a new all-encompassing component, cards.
   2. Dropped the Glyphicons icon font. If you need icons, some options are:
      1. The upstream version of **Glyphicons**
      2. **Octicons**
      3. **Font awesome**
   3. Dropped the affix jQuery plugin. We recommend using a position: sticky polyfill instead. [See the HTML5 Please entry](http://html5please.com/#sticky) for details and specific polyfill recommendations.
      1. If you were using affix to apply additional, non-position styles, the polyfill might not support your use case. One option for such uses is the third-party scrollpos-styler library.
   4. Dropped the pager component as it was essentially slightly customized buttons.
   5. Refactored nearly all components to use more un-nested classes instead of children selectors.
5. MISC
   1. Non-responsive usage of Bootstrap is no longer supported.
   2. Dropped the online customizer in favor of more extensive setup documentation and customized builds.
6. By component
   1. This list highlights key changes by component between v3.x.x and v4.0.0.
7. Reboot
   1. New to Bootstrap 4 is the reboot, a new StyleSheet that builds on normalize with our own somewhat opinionated reset styles? Selectors appearing in this file only use elements-there are no classes here. This isolates our reset styles from our component styles for a more modular approach. Some of the most important resets this includes are the box-sizing: border-box change, moving from em to rem units on many elements, link styles, and many form element resets.
8. Typography
   1. Moved all .text- utilities to the \_utilities.scss file.
   2. Dropped .page-header as, aside from the border, all its styles can be applied via utilities.
   3. .dl-horizontal has been dropped. Instead, use .row on <dl> and use grid column classes (or mixins) on its <DT> and <dd> children.
   4. Custom <blockquote> styling has moved to classes -- .blockquote and the .blockquote-reserve modifier.
   5. .list-inline now requires that its children list items have the new .list-inline-item class applied to them.
9. Images
   1. Renamed .img-responsive to .img-fluid.
   2. Renamed .img-rounded to .rounded.
   3. Renamed .img-circle to .rounded-circle.
10. Tables
    1. Nearly all instances of the > selector have been removed, meaning nested tables will now automatically inherit styles from their parents. This greatly simplifies our selectors and potential customizations.
    2. Responsive tables no longer require a wrapping element. Instead, just put the .table-responsive right on the <table>
    3. Renamed .table-condensed to .table-sm for consistency.
    4. Added a new .table-inverse option.
    5. Added table header modifiers: .thead-default and .thead-inverse.
    6. Renamed contextual classes to have a .table- -prefix. Hence .active, .success, .warning, .danger and .table-info to .table-active, .table-success, .table-warning, .table-danger and .table-info.
11. Forms
    1. Moved element resets to the \_reboot.scss file.
    2. Renamed .control-label to .form-control-label.
    3. Renamed .input-lg and .input-sm to .form-control-lg and .form-control-sm, respectively.
    4. Dropped .form-group-\* classes for simplicity’s sake. Use .form-control-\* classes instead now.
    5. Dropped .help-block and replaced it with .form-text for block-level help text. For inline help text and other flexible options, use utility classes like .text-muted.
    6. Horizontal forms overhauled:
       1. Dropped the .form-horizontal class requirement.
       2. .form-group no longer applies styles from the .row via mixin, so .row is now required for horizontal grid layouts (e.g. <div class=”form-group row”>).
       3. Added new .form-control-label class to vertically center labels with .form-controls.
       4. Added custom forms support (form checkboxes, radios, selects and file inputs).
12. Buttons
    1. Renamed .btn-default to .btn-secondary
    2. Dropped the .btn-xs class entirely as .btn-sm is proportionally much smaller than v3’s
    3. The stateful button feature of the button.js jQuery plugin has been dropped. This includes the $().button (string) and $().button (‘reset’) methods. We advise using a tiny bit of custom JavaScript instead, which will have the benefit of behaving exactly the way you want it to.
       1. Note that the other features of the plugin (button checkboxes, button radios, and single-toggle buttons) have been retained in v4.
13. Button group
    1. Rewrote component with flexbox.
    2. Dropped the .btn-group-xs class entirely given removal of .btn-xs.
    3. Removed explicit spacing between button groups in button toolbars; use margin utilities now.
    4. Improved documentation for use with other components.
14. Dropdowns
    1. Switched from parent selectors to singular classes for all components, modifiers, etc.
    2. Simplified dropdown styles to no longer ship with upward or downward facing arrows attached to the dropdown menu.
    3. Dropdowns can be built with <div> or <ul> now.
    4. Rebuilt dropdown styles and markup to provide easy, built-in support for <a> and <button> based dropdown items.
    5. Renamed .divider to .dropdown-divider.
    6. Dropdown items now require .dropdown-item.
    7. Dropdown toggles no longer require an explicit <span class=”caret”></span>; this is now provided automatically via CSS’s: after on .dropdown-toggle.
15. Grid system
    1. Added a new 576px grid breakpoint as sm. meaning there are now five total tiers (xs, sm, md, lg and XL).
    2. Renamed the responsive grid modifier classes from .col-{breakpoint}-{modifier}-{size} to. {modifier}- {Breakpoint}-{size} for simpler grid classes. For example, instead of .col-md-3.col-md-push-9 it’s .col-md-3.push-md-9
    3. Overhauled the grid mixins to merge make-col and make-col-span into a single make-col mixin, thereby ensuring mixins and predefined classes utilize the same float/flex behaviors.
    4. Added flexbox utility classes for grid system components.
16. List groups
    1. Rewrote component with flexbox.
    2. Replaced a.list-group-item with an explicit class, .list-group-item-action, for styling link and button versions of list group items.
    3. Added .list-group-flush class for use with cards.
17. Modal
    1. Rewrote component with flexbox.
    2. Given move to flexbox, alignment of dismiss icons in the header is likely broken as we’re no longer using floats. Floated contents comes first, but with flexbox that’s no longer the case. Update your dismiss icons to come after modal titles to fix.
    3. The remote option (which could be used to automatically load and inject external content into a modal) and the corresponding loaded.bs.modal event were removed. We recommend instead using client-side tinplating or a data binding framework, or calling jQuery.load yourself.
18. Navs
    1. Rewrote component with flexbox.
    2. Dropped nearly all > selectors for simpler styling via un-nested classes.
    3. Instead of HTML-specific selectors like .nav>li>A we used separate classes for .nav, .nav-item, and .nav-link. This makes your HTML more flexible while bringing along increased extensibility.
19. Navbar
    1. The navbar has been entirely rewritten in flexbox with improved support for alignment, responsiveness and customization.
    2. Responsive navbar behaviors are now applied to the .navbar class via the required .navbar-toggleable-{breakpoint} where you choose where to collapse the navbar. Previously this was a LESS variable modification and required recompiling.
    3. .navbar-default is now .navbar-light, though .navbar-inverts remains the same. One of these is required on each navbar. However, these classes no longer set background-color; instead they essentially only affect color.
    4. Navbars now require background declaration of some kind. Choose from our background utilities (.bg-\*) or set your own with the light/inverse classes above for mad customization.
    5. Given flexbox styles navbars can now use flexbox utilities for easy alignment options.
    6. .navbar-toggle is now .navbar-toggler and has different styles and inner markup (no more three <span>).
    7. Dropped the .navbar-form class entirely. It’s no longer necessary; instead, just use .form-inine and apply margin utilities as necessary.
    8. Navbars no longer include margin-bottom or border-radius by default. Use utilities as necessary.
    9. All examples featuring navbars have been updated to include new markup.
20. Pagination
    1. Rewrote component with flexbox.
    2. Explicit classes (.page-item, .page-link) are now required on the descendants of .pagination
    3. Dropped the .pager component entirely as it was little more than customized outline buttons.
21. Breadcrumbs
    1. An explicit class, .breadcrumb-item, is now required on the descendants of .breadcrumb
22. Labels, badges, and tags
    1. Renamed .label to .tag to disambiguate from the <label> element.
    2. Dropped the .badge component as it was nearly identical to labels/tags. Use the .tab-pill modifier together with the label component instead for that rounded look.
    3. Tags are no longer floated automatically in list groups and other components. Utility classes are now required for that.
23. Panels, thumbnails, and wells
    1. Dropped entirely for the new card component.
24. Panels
    1. .panel to .card, now built with flexbox.
    2. .panel-default removed and no replacement.
    3. .panel-group removed and no replacement. .card-group is not a replacement, it is different.
    4. .panel-heading to .card-header
    5. .panel-title to .card-title. Depending on the desired look, you may also want to use heading elements or classes (e.g. <h3>, .h3) or bold elements or classes (e.g. <strong>, <b>, .font-weight-bold). Note that .card-title, while similarly named, produces a different look than .panel-title.
    6. .panel-body to .card-block
    7. .panel-footer to .card-footer
    8. .panel-primary to .card-primary and .card-inverse (or use .bg-primary on .card-header).
    9. .panel-success to .card-success and .card-inverse (or use .bg-success on .card-header).
    10. .panel-info to .card-info and .card-inverse (or use .bg-info on .card-header).
    11. .panel-warning to .card-warning and .card-inverse (or use .bg-warning on .card-header).
    12. .panel-danger to .card-danger and .card-inverse (or use .bg-danger on .card-header).
25. Tooltips
    1. Removed support for “auto” placement options.
26. Popovers
    1. Removed support for auto placement options.
    2. Carousel
27. Carousel
    1. Overhauled the entire component to simplify design and styling. We have fewer styles for you to override, new indicators, and new icons.
    2. All CSS has been un-nested and renamed, ensuring each class is prefixed with .carousel-.
       1. For carousel items, .next, .prev, .left and .right are now .carousel-item-next, .carousel-item-prev, .carousel-item-left and .carousel-item-right.
       2. .item is now .carousel-item.
       3. For prev/next controls, .carousel-control.right and .left are now .carousel-control-right and –left, meaning they no longer require a specific base class.
       4. Removed all responsive styling, deferring to utilities (e.g. showing captions on certain viewports) and custom styles as needed.
       5. Removed image overrides for images in carousel items, deferring to utilities.
       6. Tweaked the carousel example to include the new markup and styles.
28. Utilities
    1. Made display utilities responsive (e.g. .d-none and d-{sm, md, lg, xl}-none).
    2. Added .float-{sm, md, lg, XL}-{left, right, none} classes for responsive floats and removed .pull-left .pull-right since they’re redundant to .float-left and .float-right.
    3. Added responsive variations to our text alignment classes .text-{sm, md, lg, XL}-{left, center, right}.
    4. Added new margin auto utilities for all sides, plus vertical and horizontal shorthand’s.
    5. Added boatload of flexbox utilities.
    6. Dropped .center-block for the new .mx-auto class.
29. Vendor prefix mixins
    1. Bootstrap 3’s vendor prefix mixins, which were deprecated in v3.2.0, have been removed in Bootstrap 4. Since we use Autoprefixer, they’re no longer necessary.
    2. Removed the following mixins:
       1. Animation, animation-delay, animation-direction, animation-duration, animation-fill-mode, animation-iteration-count, animation-name, animation-timing-function, backface-visibility, box-sizing, content-columns, hyphens, opacity, perspective, perspective-origin, rotate, rotateX, rotate, scale, scaleX, scaleY, skew, transform-origin, transition-delay, transition-duration, transition-property, transition-timing-function, transition-transform, translate, translate3D, user-select.
30. Documentation
    1. Our documentation received an upgrade across the board as well. Here’s the low down:
    2. We’re still using Jekyll, but we have custom plugins in the mix:
       1. Example.rb is a fork of the default highlight.rb plugin, allowing for easier example-code handling.
       2. Callout.rb is a similar fork of that, but designed for our special docs callouts.
    3. All docs’ content has been rewritten in markdown (instead of HTML) for easier editing.
    4. Pages have been reorganized for simpler content and a more approachable hierarchy.
    5. We moved from regular CSS to SCSS to take full advantage of Bootstrap’s variables, mixins and more.
31. Responsive utilities
    1. All @screen- variables have been removed in v4.0.0 use the media-breakpoint-up (), media-breakpoint-down (), or media-breakpoint-only () SASS mixins or the $grid-breakpoints SASS map instead.
    2. The responsive utility classes have also been overhauled.
    3. The .hidden and .show classes have been removed because they conflicted with jQuery’s $(…).hide () and $(…).show () methods. Instead, try toggling the [hidden] attribute, use inline styles like style=”display: none” and style=”display: block” or toggle the .invisible class.
    4. The old classes (.hidden-xs .hidden-sm .hidden-md .hidden-lg .visible-xs-block .visible-xs-inline .visible-xs-inline-block .visible-sm-block .visible-sm-inline .visible-sm-inline-block.visible-md-block .visible-md-inline .visible-md-inline-block .visible-lg-block .visible-lg-inline .visible-lg-inline-block) are gone.
    5. They have been replaced by .hidden-xs-up .hidden-xs-down .hidden-sm-up .hidden-sm-down.hidden-md-up .hidden-md-down .hidden-lg-up .hidden-lg-down.
    6. The .hidden-\*-up classes hide the element when the viewport is at the given breakpoint or larger (e.g. .hidden-md-up hides an element on medium, large, and extra-large devices).
    7. The .hidden-\*-down classes hide the element when the viewport is at the given breakpoint or smaller (e.g. .hidden-md-down hides an element on extra-small, small, and medium devices).
    8. Rather than using explicit .visible-\* classes, you make an element visible by simply not hiding it at that screen size. You can combine one .hidden-\*-up class with one .hidden-\*-down class to show an element only on a given interval of screen sizes (e.g. .hidden-sm-down.hidden-xl-up show the element only on medium and large devices).
    9. Note that the changes to the grid breakpoints in v4 means that you’ll need to go one breakpoint larger to achieve the same results (e.g. .hidden-md is more similar to .hidden-lg-down than to .hidden-md-down). The new responsive utility classes don’t attempt to accommodate LESS common cases where an element’s visibility can’t be expressed as a single contiguous range of view sizes; you will instead need to use custom CSS in such cases.
32. Misc notes to prioritize
    1. Removed the min—moz-device-pixel-ratio typo hack for retina media queries
    2. Changes buttons’ [disabled] to: disabled as IE9+ Supports: disabled. However fieldset [disabled] is still necessary because native disabled fieldsets are still buggy in IE11.
33. Additional notes
    1. Removed support for styled nested tables (for now)

**Comparison**

|  |  |  |
| --- | --- | --- |
| Component | Bootstrap 3 | Bootstrap 4 (Alpha 6) |
| Global |  |  |
| Source CSS Files | LESS | SCSS |
| primary CSS unit | px | rem |
| media queries unit | px | px |
| global font size | 14px | 16px |
| default fonts | Helvetica Neue, Helvetica, Arial, sans-serif | uses a "native font stack" (User's system fonts), with a fallback to Helvetica Neue, Arial and sans-serif |
| Grid |  |  |
| grid tiers | 4 tier grid system (xs, sm, md, and lg) | 5 tier grid system (xs, sm, md, lg, and xl) |
| offsetting columns | Uses col-\*-offset-\* classes to offset columns. For example, col-md-offset-4 | Uses offset-\*-\* classes to offset columns. For example, offset-md-4. |
| tables |  |  |
| inverse tables | not supported | Added inverse tables with the .table-inverse class. |
| table head styles | not supported | Added table head styles with the .thead-default and .thead-inverse classes. |
| condensed tables | .table-condensed | .table-sm |
| contextual classes | Bootstrap 3 doesn't use the .table- prefix for its contextual classes. For example, Bootstrap 3 uses .active whereas Bootstrap 4 uses .table-active. Other than that, both versions use the same 5 contextual keywords (active, success, info, warning, and danger). | Added the .table prefix for its contextual classes. |
| responsive tables | The .table-responsive class must be added to a parent <div> element. | can add .table-responsive to the actual <table> element |
| reflow tables | not supported | Reflow tables have now been dropped. |
| forms |  |  |
| horizontal forms | require the .form-horizontal class forms don't require .row when using grids | Dropped .form-horizontal class - it is no longer needed to display horizontal forms. Forms require the .row class when using grids. |
|  | Use .control-label when using grids for form layout. | It uses .col-form-label \* when using grids for form layout. \*note initially used .form-control-label but subsequently changed this to .col-form-label |
| checkboxes and radio buttons | Uses .radio, .radio-inline, .checkbox or .checkbox-inline to display checkboxes and radio buttons. | Uses .form-check, .form-check-label, .form-check-input, and .form-check-inline. |
| form control size | Use .input-lg and -sm to increase or decrease the size of an input control. | Use .form-control-lg and -sm to increase / decrease the size of the control. |
| help text | Use the .help-block class to display help text. | It uses .form-text class to display help text. |
| validation and feedback icons | The .form-control-\* classes are not available in 3. To present icons on the input fields using 3 you need to use Glyphicons. | Dropped the .has-feedback class. It is no longer required with the introduction of the .form-control-\* classes. |
| legends | No classes for styling the form legends. | Provides the option of using .col-form-legend on <legend> elements to style it more like a label. |
| custom forms | not supported | In 4 introduced custom forms completely custom form elements that replace the browser defaults. |
| Buttons |  |  |
| Semantic Style | Includes the .btn-default and -info classes. The .btn-secondary class isn't available in 3. | Introduce the .btn-secondary class. Dropped .btn-default class.  Note: .btn-info class was initially dropped in 4 but it has reappeared again. |
| outline buttons | not supported | Introduce the .btn-outline-\* classes for styling buttons with an outline color. |
| button size | .btn-xs class is available | dropped .btn-xs class (only .btn-sm and .btn-lg are available) |
| Images |  |  |
| responsive Image | Use .img-responsive class. | Use .img-fluid class. |
| image alignment | Use .pull-right, left and .center-block helper classes. | Use .m-x-auto instead of .center-block to align block-level images.  Can also use the various .pull-\*-right and .pull-\*-left responsive helper classes, as well as the .text-\*-left, .text-\*-center, and .text-\*-right helper classes on the image's parent.  Can use the various .pull-\*-none classes to disable floating. |
| Media Objects |  |  |
| classes | Includes many different classes for media objects, including .media, .media-body, .media-object, .media-heading, .media-right, .media-left and .media list and .media-body. | Uses just .media class. Margins can be applied using spacer utilities. Media objects are flexbox enabled in 4, so the various flexbox classes can also be applied  (such as reordering, etc.) |
| Dropdowns |  |  |
| structure | Apply dropdowns to lists (i.e. using <ul> and <li>). | Dropdowns can be built with <ul> or <div>. Apply the .dropdown-item to a <a> or <button> element and wrap them all in a <div> (or <ul>) with a .dropdown-menu class applied. |
| menu headers | Apply .dropdown-header to the <li> tag. | Apply .dropdown-header to <h1> - <h2> tags (as Bootstrap no longer uses <li> tags to build dropdowns). |
| dividers | Apply the .divider class to the <li> element (because it uses lists to build dropdowns). | Apply the .dropdown-divider to the <div> element. |
| disabled menu items | Apply the .disabled class to the <li> element. | Apply the .disabled class to the <a> element. |
| Button Groups |  |  |
| Justified? | Supports justified buttons groups (via the .btn-group-justified class). | Not supported. |
| Extra small? | Supports extra small button groups (via the .btn-group-xs class). | Not supported. |
| navs |  |  |
| inline navs | there is no .nav-inline class | Can use the .nav-inline class to explicitly specify navs to be displayed inline. |
| navbars |  |  |
| colors | Limited (preset) color options. Supported inverse navbars but not the other classes. | Now (preset) color options. Introduced the .navbars-light class, and allows the .bg-\* classes to be used on navbars. |
| navbar alignment | use .navbar-right, .navbar-left to align components within the navbar | Can either use spacing utilities such as .mr-auto, or any of the flexbox alignment utilities? |
| navbar forms | Add the .navbar-form class to forms within navbars. | Dropped .navbar-form class. It's no longer necessary |
| fixed navbars | Uses .navbar-fixed-top and .navbar-fixed-bottom to fix navbars to the top or bottom. | Uses .fixed-top and .fixed-bottom. |
| Pagination |  |  |
| default pagination | Only requires .pagination to be added (to the <ul> element that represents the list of pages). | Must also add .page-item to each <li> element and .page-link to each <a> element. |
| pagers | Use .previous and .next for aligning pagers. | Pagers have been dropped in Bootstrap 4 (alpha 3). |
| labels |  |  |
| pill labels | The .label-pill class is not available. However, Bootstrap 3 does have badges (which achieves a similar visual effect). | Labels have been replaced by badges in 4. Badges can use the .badge-pill for rounded corners. |
| tags |  |  |
| Supported? | no | Tags have now been renamed to "badges". There replace labels from 3. |
| jumbo Tron |  |  |
| full-width | The .jumbotron-fluid class is not required on full-width jumbotrons. | Introduced the .jumbotron-fluid class for full-width jumbotrons. |
| progress bars |  |  |
| Uses <progress>? | Doesn’t use the <progress> for progress bars. Instead, applies progress bar classes to nested <div> elements. | Using the <progress> element was abandoned in Alpha 6. In 4 now uses the <div> element again. |
| Glyphicons |  |  |
| Supported? | supported | Not supported. |
| Typography | Bootstrap styles are applied to the <blockquote> element by default. | Introduced the .blockquote class for styling the <blockquote> element (i.e. styling this element is now opt-in). |
| page Headers | .page-header classes is supported | .page-header classes is not supported |
| description lists | .dl-horizontal class was used to declare a horizontal list. | Horizontal lists are now declared with the .row class on the <dl> tag, then any of the grid system's predefined classes to the <dt> and <dd> tags. |
| Non-Responsive Usage |  |  |
| Supported? | Supported. You can specify a layout to be non-responsive | Not supported. |
| List Groups |  |  |
| Linked List Items / Button List Items | Apply .list-group-item to the <a> element. | Apply .list-group-item-action to the <a> element. |
| Collapse |  |  |
| Show Content | Uses .in to have content expanded upon page load. | Uses .show to have content expand upon page load. |
| Cards |  |  |
| Supported? | not supported | Introduced in 4. Cards replace functionality that was previously provided by panels, wells, and thumbnails. |
| Panels | Supported. | Not Supported. Use Cards Instead. |
| Wells |  |  |
| Supported? | Supported | Not Supported. Use Cards Instead. |
| Thumbnails |  |  |
| Supported? | Supported | Not Supported. Use Cards Instead. |
| Breadcrumbs |  |  |
| Classes | Uses the .breadcrumb class against the <ul> tag. | Also requires .breadcrumb-item to be applied against all <li> elements that make up the breadcrumb.  Breadcrumbs can also be used outside of lists. For example, the .breadcrumb-item could be applied to a bunch of <a> elements that are wrapped in a .breadcrumb element. |
| carousels |  |  |
| carousel Item | Use .item class. | Use .carousel-item class. |
| affix |  |  |
| Supported? | Yes | No |

References

<https://v4-alpha.getbootstrap.com/migration/>

<http://www.quackit.com/bootstrap/bootstrap_4/differences_between_bootstrap_3_and_bootstrap_4.cfm>