Farm Code

2002

The Other Big Red Book
AWS—(All Welding Stuff)

Personnel
Committee on Farm Code
All comments were made by voluntaries on
The American Welding Society Online Forum FC-2002
The comments and Ideas express in this code were not altered in any way other than spelling corrections and arranged to form this code.
This code is an on going Document that will be forever changing with new technology and as of December 4, 2007 this code is up to date, A new edition will be out on December 5, 2007. Order your copy today before it’s out of date.

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**Scope** - If it's not going to the moon then who cares how you weld it.
If you can smile when things go wrong then you have someone in mind to blame.

**1. General**

What can be done sober can be done drunk!
If you can jump across the gap your within code.

In accordance with safety requirements, when work is to be done at elevated heights, the following shall be used for welding:
FCAW shall be by remote method. Remote apparatus shall utilize a broom stick with the gun tapped to it. A cantilevered string shall be tied to the trigger for actuation.

Footnote 1: when using SMAW if lead is too short, short circuiting rod to a piece of rebar and using for stinger is acceptable!

Oxygen bottles shall be filled with clean dry air per good industry practices
Oxygen bottles shall not be thrown to the ground from heights greater than four stories. The ground should be soft enough such that the bottle does not bounce more than three feet into the air nor should it bounce more than once.
All threads should be liberal slathered with thick grease before attaching the regulator. It is best to stand to one side in case there is an explosion when
the oxygen valve is opened. Tighten the gland nut until you hear an audible squeak.

Acetylene valve that have frozen with ice can be effectively thawed using a cigarette lighter. Always leave a 12 inch adjustable wrench in the area just in case the acetylene tank has to be turn off in a hurry.

If having unexplainable welding problems with the GMAW or GTAW processes, assume it is always the shielding gas. Take shielding gas cylinder and lay it on it's side. Continue to roll cylinder around until gas has been evenly distributed through-out or properly blended when using a mix. Cylinder caps can be lost and misplaced. Only need one cap available to place on the cylinder going back to supplier.

When using Oxyacetylene for welding or cutting make sure to have regulators for the fuel gas turned up to the "red" portion on the regulator, this will allow for proper heat when cutting anything over 1/8" thick. When welding regulators frost up, do NOT close cylinder and slow production. Use the cutting torch to melt away ice and then re-tighten.

All welding and cutting gas hoses shall meet rubber air hose specifications. Those expensive things are just a gimmic.

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Preheat is only required when somebody who can make trouble is watching. all preheat shall be performed with a zippo. If the work piece is to large, a nice wood fire will suffice.

In the event of bees or wasps on the work piece, a propane tank may suffice as Raid (tm). Simply crack the valve, light a match Soup and sandwiches may be heated in electrode storage ovens.

if it's too wet out to weld without zapping your nads, an acceptable substitute like JB weld is acceptable, only if the guy holding the part in place agrees with you.

Preheat Electrodes by sticking the electrodes in the exhaust of the tractor! Preferably when the tractor is still cold and spitting moister out of the exhaust.

Preheat: Regardless of the type of base metal, preheat shall be sufficient to drive all moisture from the pores of the base metal or until it stops "sweating". Once dried, additional preheat is a waste of gas and money. For critical jobs on any aluminum alloy, smoke the base metal with an acetylene flame and heat it with an oxidizing flame to burn off the carbon black.
All metals should be preheated to drive out moisture. This includes all steels, titanium, aluminum, etc. The preheat temperature is job dependent. You never know what it will be until you start heating the metal up. You can stop when the water stops bleeding from the pores. You'll know when it hot enough. Preheating should be completed just before morning coffee break so that it will be ready to weld when the break is over. Preheating is not required if it is a hot day or if the boss is in a hurry. Preheating is never necessary before tack welding.

When welding tubular structures greater than 15' in diameter, plate preheat shall exceed 2000F if the initial roll of the plate is warped to bring it back into alignment.

If said tube/can is dropped by the crane, and subsequent dent to large to fill with bondo, repair area shall be heated to 2000F and hammered until it looks like a tortoise shell, fill welded and bondo'd to smooth appearance.

When working in a building and the work area is too far away for ground leads to reach it is permissible to clamp your ground to the ground or neutral buss bar in the buildings electrical service box. Simply knock the flux off the biggest smaw rod available and jam it in the nearest 110v outlet ground near your work area and clamp it to your work. If the lights go out and you hear sirens roll up immediately and act nonchalant as possible ....pretend you just arrived.

2 Safety

Respirator/ Face Shield
Welding Hoods
Lifting
If a 1/4" fillet weld fails an oil (diesel) test, just burn two passes overtop of the spot in question! It takes too long to grind out a pinhole.

3. Fabrication

If something doesn't look right, you're wrong. Keep going with it and in the long run things will work themselves out.

Fitup shall be "good enough".

"we'll proceed at risk when welding without a PQR"

3.1. SMAW:
SMAW: "Some Metal Arc Welded."

Electrode conditioning: Short the end of the electrode (including damp low hydrogen electrodes) to the workpiece until the flux on the rod turns red. Additional filler metal can be added to really big blow holes, burn through, and other gaping openings by manually adding flux free SMAW electrode to the weld puddle. Electrodes that have been wet can be "sun dried" prior to use. Disregard any white powdery substances or cracked or flaking flux coating. Increased amperage may be required. Electrodes of questionable origins or pedigree may be used if inspection is
not required or if no cracks are observed when the weld is completed. Electrode ovens can also serve double duty as an oven for drying wet gloves, work boots, and pizza. Electrode ovens should only be turned on if the electrode is noticeable damp or wet. All baked potatoes in the rod ovens shall be held at a min of 250°F for a period of no less than 4 hours, ......or until a fork is easily inserted to confirm that they are completely done.

Don't forget 7018's must be kept in an old refrigerator at all times and only get as many as you need for any particular application. If rods become wet, short out the stick electrode to the part being welded for a given amount of time. If flux falls off while welding reduce the amount of time that the rod is shorted out.

Crank her up and burner in der!

All SMAW rods soaked by rain the previous nite are preferable to use first...water is a good conductor therefore this will increase the deposition rate of any rod by 25%

Filler Metal for GTAW:
Coat hangers and SMAW electrode with flux removed may be used. It shall be unlawful to use plastic coated clothes hangers as welding rods. molten plastic has no strength even if it adds ductility. a little molten plastic may be good for corrosion resistance when you are welding exhaust pipes and mufflers. But it still stinks. The coating on the hanger meets the flux requirements for FC2002 code

No drying for 1109 electrodes is required. If the 1109 rods are wet, dry them in the home stove set on broil, until your wife threatens to divorce you because of the smell.

You shall not weld aluminum with 1109 rod

Experience : I DID THIS ONCE WITH SOME 6011 RODS THAT WERE DRIPPING WET I WAS RUNNING A BODY SHOP FOR A CAR DEALER AND NEEDED TO PUT IN A GOOSENECK HITCH ON A NEW PICK UP OWNER WOULD NOT BUY NEW RODS AND INSISTED I DRY THE WET1'S AND USE THEM SO I CALLED A SALE MANS WIFE AND ASKED HER TO DRY THEM IN HER OVEN TOLD HER PUT IT ON 350 AND COOK EM FOR 30 MINUTES WHEN SHE BROUGHT THEM BACK THEY WERE JET BLACK AND THE OWNER STILL INSISTED I USE THEM LMAO AFTER ABOUT 20 MINS LOOKED LIKE I HAD BEENATTACKED BY A BAND OF INDIANS I FINALLY GOT A NEW BOX OF RODS BUT TI TOOK HALF THE DAY LMAO AND THE CUSTOMER WAS WAITING

An oxy-acetylene torch will do a better job in heating soup and sandwiches. Simply preheat the steel to cherry red and use it for a skillet. The soup will get hot when you burn the lid off the can with the torch (Ha!!! and my wife thought I didn't know what the "Iron Chef" is.) This will serve 2 purposes,
heat up your lunch AND prepare the torch tip for burning the proper Farm Code bevel.

Blackening a steak with the rosebud is well within the code.

Burning cowpies as you work should provide sufficient preheat! If not, the first weld pass will bring it up to temp!

Anybody that can afford a 120v welder is automatically a welder by trade. Farmer can and will provide old plow shares to be welded on for reinforcement. Diamond plate is the best looking patch material on the farm.

Firewatchers are just a way the customer has of trying to milk money back out of you......when ever possible avoid having to pay for this coffee swilling lackey. Besides wetting the area underneath that aluminum ladder your working off of with a garden hose will prevent any thing bad from happening.

Welding symbols shall consist of an arrow pointing to the joint with the notation "weld here" or if the weld is of critical nature use the note "weld as required".

Grounding through critical valves is permitted. Arc strikes across seat give added value to seal.
The JB weld shall be certified by ACME surveyors. Use of elmers wood glue is only permitted with engineering approval.

In the event that you don't have access to an all position wire, a series of uphand Metal cored tacks followed by a downhand cap will suffice for an
uphand. If it looks like a weld, it'll hold like a weld.

Mating flanges not within alignment tolerances may be heated to, but not below "cherry red", and any mechanical means necessary which include hammering, bending, beating, kicking, use on come-a-longs, winches, pick up trucs, etc may be used to bend pipe into correct tolerance.

Quenching of the weld shall be performed by the drunkest member of the crew using a urine specimen only if domestic beer has been consumed. Footnote: Consumed liquor may be substituted on days colder than 30 degrees.

Back gouging:
Not required unless the inspector is looking over your shoulder and insistent that it be performed.
Extent: just enough, but not too much. Minor slag inclusions, porosity, and incomplete fusion can be burned out by the next weld pass.
back gouge metal till it makes a sound

Post cleaning:
Not required. The slag covers many defects and protects the weld from rain, snow, and paint.

SMAW
Celluloses experiencing arc blow or other arc difficulties shall be held under a faucet for no less than 30 seconds to re-hydrate the cellulose coating. Rusty water shall not be a concern. The O2 dissociated from the Fe shall be consumed in the arc becoming gaseous steam, and the Fe shall increase deposition rate.

Concrete re-bar may be use only if the big hole is deemed to be really big or the bevel gap is deemed too wide.

All non weldable rebar is weldable, all weldable rebar is deemed overpriced and therefore not allowed

if rebar is found in your way, cut your epoxy anchor down accordingly and properly anchor your item, after all they don't really need to be that long. consult ricky bobby first.

A 3/8" horizontal gap cut wrong do to an indrawn line and relying on a straight edge fit to de part for the manual plasma cut in the horizontal position on 3/16" plate can be filled with duel shield FCAW, but not GMAW, because "We're not allowed too." There's butt joint, and then there's "Ass Crack" joint. 7
3.2 GTAW - Filler Metal

Coat hangers and SMAW electrode with flux removed may be used.

Aluminum parts can be held in position with super glue rather than clamping for TIG welding.

3.3 GMAW

GMAW-MP: MP = Manual Pulse: pulling the trigger rapidly so that the metal can cool real quick, useful for filling gaps in structural members and if appearance is really, really, important. Also used for vertical and overhead welds when the machine is set for spray arc and you don't feel like changing the settings. Especially useful for metals 1/8" and thinner when the machine is set for welding 1" steels.

Dual shield, "Flat Only" flux core wires can weld in all positions if you turn the heat down. Shielding gas is optional as the wire is dual shielded, meaning the gas is redundant and the flux in the wire is all you need.

When presented with a aluminum job, in the absence of a plasma cutter or other means of cutting it, the smallest 6010 rod and the highest output welder available may be used.

This is accomplished by cranking the welder up and blasting through the work piece until its severed. The cut edges should be ground clean if you really feel like it or if someone is watching.

3.4 FCAW

FCAW: Pertains too "Farmer Code Arc Welds."

Reels of GMAW, FCAW, or SAW electrodes should be sprayed with WD-40 to reduce friction through the welding gun.

Members that are cut twice and still found to be too short may be welded provided the gap is reduced or closed with a bolt, threaded rod, or electrodes with the flux removed. The final weld shall preferably cover any threads or electrode stubs.

If the arc wanders and you believe arc blow is the culprit, wrap the welding lead around the part several times and use DC at high amperage. Polarity can be switched if the arc blow isn't diminished. The polarity of AC can be switched by reversing the cables at the welding machine terminals.

Titanium welds that are discolored (straw to blue) should be wire brushed before the inspector sees it. The resulting silver weld is better than new.

Hydrogen is a figment of the inspector's imagination. If you can't see it, taste it, smell it, or feel it, it doesn't exist. If the inspector throws a hissy fit, burn the "hydrogen" out with the next weld pass.
Any metal can be welded in a pinch with stainless rod if there is enough nickel in it. Even titanium.

As the number of the stainless steel alloy (304, 308, 309, 310, etc.) increases, so does the chrome content. You can tell if the metal is stainless steel if the magnet won't stick to it and it is shiny. But if it isn't heavy, it is aluminum.

When purging pipe, purge long enough to feel the gas come out of the pin hole. Taping open root joints is wasteful of argon and is not necessary. A good gas filter is required with argon purchased in high pressure cylinders and bulk liquid tanks to remove all lumps and foreign materials.

There is no such thing as an excessive root opening. A wider backing bar will fix it. When a backing bar is not available, any piece of metal will do. Extension tabs are a waste of time, material, and money.

Liquor is mandatory equipment on days colder than 30 degrees along with a pipe heater fabricated out of 2 3/8 or 2 7/8 whatever u can get ur hands on it dont really matter by the time u get all the stuff to do itt itll be dark and you'll be drunk

3.5 SAW welding shall be performed in the overhead position.

4. WPS

Welding Procedure Specifications (WPS's) are only available for reference. Proper engineering, fabrication and testing is to be determined by the welder(s). In the event no WPS is available for review, weld all unknown ferrous materials with E6011 electrodes. Keep electrodes in a moist area on the floor in a torn box. If E7018 or other lo-hy rods are to be used, store electrodes in a closet. Keep light on in the closet most of the time. This will allow for proper drying.
5. Inspection

5.1 qualification of welding Inspectors:
2.1 your ability to confirm "looks good to me"
2.2 when examining a weld that seems to meet specs - always put on another pass or two just in case
2.3 always ask "what does the welder think"
2.4 Thought process should always include "whatever it takes to get er done"
2.5 You can always impose less stringent criteria - who lives in a perfect world?
2.6 Conflict of Interest: yeah....whatever
When did you receive your "inspector badge"?

the only inspector that counts on any job is the guy with the roll of bills in his overalls...

when third party inspector comes to inspect heat treated vessel make sure that your most belligerent welder has lunch while sitting on fresh arc strike so that inspector does not notice

Most welding inspectors don't know jack about welding. When a weld is rejected or if the inspector tries to tell you to do something that is different, challenge him to show you how to weld it. That will shut most of them up. You can always use the argument that the engineer is overly conservative and nothing you've welded has ever broken before. That's why there are safety factors built into the design codes.

Acceptance Criteria: As long as it holds, it's good. If it breaks, add more weld.
Weld size: make it big enough that it won't break.
Weld length: make it long enough that it doesn't break.
Tack welds: that's big enough.
Slag inclusions: turn up the heat and burn it out with the next pass. If additional weld isn't required, paint it.
Porosity: see slag inclusions above.
Cracks: weld over it before the inspector sees it.
Incomplete fusion: see cracks above.
Overlap: no problem, there's fusion under there somewhere.

Acceptance criteria - NONE. If after making the completed weldment the welder thinks it's "good enough", well then, it's "good enough". And if the welder by chance doesn't think it's good enough, leave as is. Repair only needed if inspector catches it.

Alternate Inspection Criteria - At the inspector's discretion. No published set of standards has been adopted or implemented by this organization for acknowledgement that the inspector will most certainly add opinions to any written criteria published. Organization also acknowledges that said inspectors will enforce more stringent criteria than necessarily intended.

*footnote 1 - please disregard any standard, statement, criteria, requirements, etc, that you may find to be in direct conflict of the fact that "you've always done it this way"!!
"footnote 2 - please disregard any standard, statement, criteria, requirements, etc, that you may find to be in direct conflict of the fact that "you've always done it this way"!!"
Thats something else I've heard one time to many

**5.2 Magnetic Particle Testing** shall be limited to nonferrous metals or when the suspected defect is no less than 1 inch below the surface. Back gouges shall be tested from the first side welded.

Plugging in a 120VAC Mag-particle yoke is optional.

**5.3 Penetrant Testing** shall incorporate the use of solvent (gasoline, kerosene, alcohol, acetone, etc.) to flush off any penetrant from the surface to be inspected. Excess penetrant may be removed using a paint brush saturated with one of the solvents listed. Developer need not be used if the defects are large or there is no burning desire to find said defects. If used, a heavy dripping coating is better than several light layers. Surfaces may be prepared by grit blasting or power brushing.

Dye penetrant may be power-washed before applying developer, provided the dwell time is sufficient. Insufficient dwell time may be compensated for by spraying on the developer in multiple, heavy coats.

Acceptance criteria - NONE. If after making the completed weldment the welder thinks it's "good enough", well then, it's "good enough". And if the welder by chance doesn't think it's good enough, leave as is. Repair only needed if inspector catches it.

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**5.4 RT.**

All densities are acceptable unless there is a crack showing in which case it shall be reshot to greater than 5.0 H&D

Use of ammonia in the developer is allowed.
Use of lead screen plaque IQI's are beneficial. (but only when contract docs stipulate use of IQI, if not, none is used)

The shorter the SFD the better.

Sighting in is mandatory.

Cracks are slag, LOF is slag, and if the slag is rejectable then it's porosity, if the porosity is rejectable, then it's a film scratch.

Use of ASME V is not allowed, nor is ASTM E1032

Acceptance Criteria
All welded parts shall be dropped from the height greater than 3 feet. All weld pieces still welded shall be deemed acceptable.
If your gonna grow up stupid, ya better grow up tough

5.5 UT equipment qualification:

A minimum noise to signal ratio of 100:1 shall be used
Horizontal linearity shall be equal to the bottom of the corner notch
Response shall be no less than 20DB, or a 200 amp spike applied to the instrument prior to testing.
The equipment dynamic range shall show a minimum of 20DB change in amplitude.
Prohibited reflectors: Flat bottom holes, side drilled holes, and machine notches.
Acceptable reflectors, corner reflectors
Use of couplant shall be prohibited.

Equipment not meeting these requirements shall be dropped a minimum of a 40 foot free fall and retested

Defects may be obscured by needle-gunning the heck out of the surface.
Rough welds should be covered with red body filler putty
Porosity open to the surface may be obscured by striking with the ball end of a ball peen hammer to close the open pore.

Ultrasonic Testing: calibration blocks are not required. Calibration may be accomplished using the edge of a beam or plate if angle beams are used to search for cracks or other things. Straight beam scanning is only required if a lamination is know to exist

when doing commercial jobs, acr strikes longer than 1 inch shall be wiped with gloves and smeared with mud!
Footnote 1: All drag marks for striking an arc are not considered arc strike.
Footnote 2: Just a little bit of it won't hurt anything.
Footnote 3: Inspection of arc strikes is prohibited as it's just a way for the inspector to get more money from management.

When in doubt, always call for X-ray. If the weld doesn't pass X-ray, do some research to find a code that isn't as stringent. If it still won't pass, get the owner to declare the weld to be non-structural.

Acceptable UT technique is strike the welded part with a 2 lbs. Ball peen hammer. If the hammer blow does not yield a "Dull
Thud" and nothing falls off the work, weld is considered acceptable.

6. Qualification

We will qualify him later and if he doesn’t pass we'll put another welder who did pass to put his stamp on it.

Welding may be performed only by certified personnel, but irrespective of the processes and positions a person is actually qualified for.

Critical welds may be deposited by an unqualified welder provided the cover pass is deposited by a certified welder or if the foreman overseeing the work is a qualified welder.

Yes anybody can mig weld all you have to do is pull the trigger.

Anyone trained for GMAW can use FCAW without further instruction, after all its just a wire and the flux will float to the top regardless of how you run it.

Any individual that has a welder that is kept in a building called "The Shop" and knows how to turn it on, regardless of its operational condition, shall be considered a CFW. This said individual must demonstrate the ability to know what lead is the work lead, and what lead is the rod holder. For DC only machines it shall be acceptable to use the work lead as the rod holder if a polarity change is needed, and the power supply is more that 10' away from the point of operation. This rule is given to increase productivity, and only in effect during planting and harvesting seasons.

Any individual working on the same day, and working for the same farm shall be a CFO. It is the responsibility of this person to move equipment in and out of "The Shop" for the CFW. After 1 day of observing and working under the CFW, the CFO is considered to be a CFW.** See note #1.

If repairs are required on actual tillage equipment, the said repair shall be painted with white paint to make it easier to see the crack in the repaired section at a later date. If the repair is made by plating over the broken section, the plate must be as least 2x the original section so when it breaks again it will be next to the plate making the repair easier next season.

** note #1: The CFW must be older in age than the CFO, usually a father or oldest brother. The CFO must have 2 years of experience performing all sh*@ jobs before they can be eligible for CFW qualification. This note is void for single person farms. In that case the individual shall qualify for default CFO/ CFW qualifications.

Note 2:

In the case where either the CFW or the CWO cause a weld to fail in which the combine (CW combine welds) runs in circles creating circles in the corn field (CFC corn field circles) it shall be deemed a supplementary variable created by a UFO and therefore acceptable by the FPM/FW (field production manager/farmers wife) but only in the case where the FPM/FW did not witness the formation of the CFC.
Note 3:

If the FPM/FW did witness the CFC, then the CFW and CWO must recertify in the barn overnight while the FPM/FW calls the media and sells pictures of the CFC henceforth blamed on the UFO to recoup losses caused by the CFW and CWO.

7. Repair

Repair of mislocated Holes: Holes shall be filled with any slug that fits! with minimal weld to ensure slug stays attached!

All cracks can be repaired at the end of the season, if it doesn't make it that long, run it till it breaks.
It is guaranteed that I will weld it again if it breaks before it gets out of my sight.

100,000 mile guarantee. 100,000 miles or if it leaves my driveway, which ever comes first.
"If You don't abuse it, it won't break" "I don't charge extra for spatter, slag, or undercut, and if You don't like it like it is, I can put some more on top at additional cost"

ANY and ALL repairs made to implement structures at the joint site including but not limited to the following: Trailer tongues, goosenecks, pto's, three points, spring hangers, spindles etc. Shall be repaired by this procedure: If it will take longer to grind our the previous weld then to smoke a Marlboro short and/or if you forgot your grinder, cord or air hose; then an extraneous member of scrap angle, channel or plate must be applied over the repair area and scabbed on using the first available smaw rod you come across in the bottom of your toolbox. It is suggested that double rates be charged for engineering fees, however it is required by code that the customer is assaulted with lengthy explanations of how you saved them money.

Footnote: For any mowing decks repaired cleaning is unnecessary and actually prohibited, hay fires promote proper heat temperament of the deck and aid in removing useless bearing grease. In order to insure proper metallurgy it is suggested that patch repair material be cut from the actual deck being repaired and/or any other unused implements nearby.

Cracked welds may be repaired by running another bead over the crack (burn 'er in dere)

Grounding through cranes and chains are permissible, chain arc strikes give added alloy content to base metal!

that welding of damaged crane booms, chains + winch housings is permitted as long as its done on the same job the damage was caused on. Or the welding involves "necessary modification" to get the job completed.

"just run a bead of silicone over it it'll hold till next year"

the proper material for boom lacings should never be used for crane repairs. A53 "water pipe" of the appropriate size should be used instead. If you have no A53 on hand, use anything that you can get to stick with a welder.
Porosity under an 1/8" in diameter can be repaired with a crayola crayon while part is still hot.

FC2002. (in the view of many folks) Like the other great documents of our time, such as;... The U.S constitution and the Bible are in actual fact living documents, subject to the varying interpretations of each successive generation and more importantly, their own personal and individual truths.

An example of a misinterpretation of FC2002 would be any conclusion that would cause any involved party, individual or corporate entity to feel uncomfortable, embarrassed or goodness forbid--guilty.

The only absolute is of course flexibility. FC2002 when properly applied SHALL make you feel good.

Footnotes are like feet..... and who actually takes the time to look at somebody's feet anyway?? .... Habitual shoppers and Imelda Marcos may review footnotes if they so wish.

Any conflict or dispute between entities involved with a project or representatives of other code bodies shall be resolved by following the steps mentioned below.

1. A listening session where each party recounts what the code passage means to them.
2. Chakra alignment of all parties involved
3. If steps 1 and 2 fail to bring concord to all parties an all night drumming circle shall be held
4. An arbitor shall be called at this point to provide the following to the disputing parties
   a. Herbal scented soaps
   b. Lotions with essencial oils
   c. Pan Fluit or Mandolin music to accompany mediation
   d. Animal free (vegan) meals and at lunch and breaks

Wait a minute....... This is a Farm code!

There are cows moving through that broken gate toward the highway........ Just go Fix the thing already.