CATA Curricular Code Change Proposal

Make a copy of this document. In order to input information.

Contest:	Ag Welding
Proposed by: (Name, School, Email)	John Williams, Fresno State, jswilliams@csufresno.edu

Issue: (Describe the reason/rationale for the proposed change.)

Changes are needed to the code to elimnate the portfolio portion of the contest, add an additional tie-breaker, and add two new areas to the contest. The need to add to the qualifying portion to the contest is also needed to better evaluate the teams trying to earn a spot for the final round.

Please answer yes or no to ALL the questions below.

This proposal will require a contest to open out of rotation	No
The change will affect General Rules	No
The change will affect the awards needed.	Yes
Which JudgingCard scorecard will be used for tabulations.	Universal Form J
The proposed change will affect contest forms.	No
The proposed change will affect contest hosting site. (e.g. additional facilities, new sections, additional scoring, etc.)	No

If you answered yes to any of the above questions, you need to include the following signatures: Click here for link to CDE Contest Advisor and Coordinator list.

CATA Approved Contest Advisor's Signature	N/A
agreeing that changes are able to be accommodated by	These are Darol Fishmans Changes, I am submitting on his behalf. He is the host coordinator

If you answered yes to any of the above questions, please explain.

*It is highly recommended that you, or a representative, attend the pre-conference governing board meeting to answer any questions regarding proposed curricular code changes to contests that are requested to be opened out of rotation.

It will add an additional subcontest award area	

Description: (Describe what is changing.)

- 1. Adding Identification as a Sub Event and to the qualifying round
- 2. Adding a third tie breaker
- 3. Eliminating the Job Portfolio and replacing with Applied Skills and Knowledge Sub Event
- 4. Change verbiage regarding PPE
- 5. Adjust point value for written test questions
- 6. Add an idenfication list
- 7. Change method to qualifying round, can be on Friday or same day as rest of contest
- 8. Use Identification and Written test as the qualifying round

Proposed CATA Code Change: (Only include the section that the proposed change pertains to – do not include the entire contest. Reference numbered section. If editing text, show new text with old text in parenthesis. For large changes, set track changes in the Word document and attach the file, with edits, to this document when submitting.)

See Attached Code with Changes in Red					

Instructions for Submitting Curricular Code Change

- Make sure the form is complete.
- Download and Submit this document as a PDF
 - \circ Click File \rightarrow Download \rightarrow Download as a PDF
- If your proposal requires signatures make sure to contact the contest advisor and contest host. **Tip:** Docusign, Doc Hub are great sources for digital signature requests.
 - Click Here for contest Host and Advisor List
- Email completed Curricular Change Proposal PDF to <u>cata@calagteachers.org</u> by June 1st.

Warning: Make sure you add all the topics or concerns you would like to discuss at the Curricular Code CDE meeting. If it's not posted on the CATA Curricular Code Changes website by June 1st, it **cannot** be discussed.

AGRICULTURAL WELDING

Revised 12/2023

Purpose and Standards

To evaluate the contestant's manipulative skills, general knowledge and professional presentation as these correlate to his/her preparation for employment in the broad field of welding (agricultural, industrial, or other).

Foundation Standards: Mathematics Algebra, 10, 13, 15 and Geometry 9, 10, 11. Technology 4.1, 4.2, 4.6. Problem Solving and Critical Thinking 5.1. Health and Safety 6.2, 6.4, 6.5. Ethics and Legal Responsibilities 8.3. Leadership and Teamwork 9.1, 9.2, 9.3.

Agricultural Mechanics Pathway Standards: B1.1, B1.2, B3.1-B3.3, B5.1-B5.5, B7.1-B7.5, B8.1-B8.4, B9.1-B9.7.

Scope of the Contest

Contestants will demonstrate their ability to perform jobs and skills that are reflective of those required in the welding industry. Specific competency areas will include the following:

Safety *Shielded Metal Arc Welding (SMAW) *Oxy Fuel Welding (OFW)

Measurement *Gas Metal Arc Welding (GMAW) *Cutting Processes

Blueprint Reading *Flux Core Arc Welding (FCAW) Weld Testing/Inspection

Project Layout *Gas Tungsten Arc Welding (GTAW)

The contest will consist of a four way rotation including the following events or contest areas:

- Welding Application Hands on component
- Written Test/Tool & Supply ID General knowledge component (Preliminary Round)
- Weld Testing/Inspection Evaluation/quality control component
- Job Portfolio/Application Professional presentation component
- Applied Skills and Knowledge Welding skill/knowledge component

Contestants

The team shall consist of three or four members. The scores of the three highest team members shall be used for the team score. All team members are eligible for individual awards.

If the number of teams eligible to compete at the State Finals contest exceeds the number the Contest Hosts feels they can safety accommodate, the State Finals Contest Host will hold a preliminary round and a final round. *This may be accomplished by one of two methods:*

The preliminary round will be held Friday and the final round will be held the following day. -or-

The preliminary round will be held on the same day prior to the final round being held.

All contestants will compete in the preliminary round, which will consist of the Written Test *and the Tool & Supply Identification* class with the top combined team scores propelling them into the final round.

The host school shall inform the membership of which qualification method shall be used at least 90 days prior to the event

^{*}A minimum of three processes will be incorporated into the applied portion of the contest.

The tiebreaker will first be the contestant's individual scores beginning with highest individual, then second highest and so on. If a tie still persists, the welding symbols questions of the test will be used.

The contest host will announce the number of teams moving on to the final round no less than 14 days before the State Finals contest. Preliminary round scores will be added to the final round scores on Saturday.

Classes

Class	Individual Points	Team Points	
Welding Application	200	600	
Written Test	50	150	
Tool & Supply ID	50	150	
Weld Testing/Inspection	50	150	
Job Portfolio/Application	50	150	
Applied Skills & Knowledge			
Total	400	1200	

Breaking of Ties

- 1. In the Agricultural Welding Contest, individual or team ties will be broken on the basis of the highest individual or team score using the Written Test score.
- 2. If a tie still exists, the individual or team Welding Application will be used to determine the high individual or team.
- 3. If a tie still exists after 1 and 2 above, the individual or team Applied Skills & Knowledge scores shall be used to determine the high individual or team.

Sub-contest Awards

Sub-contest awards will be given for high teams and individuals in the following areas: Welding Application, Written Test, **Tool & Supply ID**, Weld Testing/Inspection, and **Job Portfolio/Application Applied Skills and Knowledge**.

Requirement of Host Institution

See equipment supplied by the host committee under Event Rules

Event Rules

- I. Each qualifying contestant will compete in all four events.
- II. Equipment supplied by the host committee:
 - A. All necessary welding machines
 - B. All consumables will be provided and contestants are required to utilize the provided materials
 - C. All instructions and procedure sheets with drawings
 - D. All materials for the host committee and judges
 - E. A four-function calculator for the Job Application rotation
- III. Equipment supplied by the contestant:
 - A. All PPE (Personal Protective Equipment)
 - 1. Safety glasses (approved ANSI Z87 with side-shields)
 - 2. Hearing and or ear protection

- 3. Welding helmet/face shield/goggles with appropriate #5 #7 filter lenses for the OFC and OFW processes
- 4. Welding helmet with appropriate #10 #12 filter lenses for the AW processes
- 5. Leather gloves with gauntlets
- 6. Appropriate leather material welding jacket
- 7. Leather boots
- B. Tools
 - 1. Steel tape measure
 - 2. Steel ruler
 - 3. Combination square
 - 4. Rafter square/speed square
 - 5. Try square
 - 6. Depth gauge
 - 7. Fillet Gauge
 - 8. Calipers
 - 9. Protractor
 - 10. Compass
 - 11. Magnetic Square
 - 12. Soap Stone
 - 13. Chipping hammer
 - 14. Wire steel brush
 - 15. Locking welding clamp
 - 16. Locking pliers
 - 17. Adjustable end wrench
 - 18. Diagonal cutting pliers
 - 19. Welpers
 - 20. Metal file
 - 21. Scratch awl
 - 22. Oxy-fuel torch tip cleaner
 - 23. Cutting guide
 - 24. Flashlight
 - 25. Pen
 - 26. Pencil
 - 27. Marking pencil
 - 28. Cordless power tool with wire wheel only
- IV. Contest uniform will consist of the following:
 - A. Black work pants no synthetic materials
 - B. Closed toed leather boots
 - C. Long sleeve, button down, shite cotton shirt
 - D. FFA Jacket *
 - E. FFA Tie *
 - F. Appropriate coveralls, leather work apron with sleeves, welding jacket, long sleeve shirt *To be worn during check in ONLY with black pants, white long sleeve button down shirt, and leather boots and not during the contest.
- V. Contestants must correctly use the welding equipment during the contest. Equipment set up and operation is essential to the welder's ability to function in the workplace. Students are expected to be familiar with a variety of machines and to be able to set up machines for the given process. Contest personnel will be available to assist in unusual complications that may arise associated

- with equipment set up. If it is determined that the machine malfunctions beyond the contestants control, the contestant may be given the opportunity to redo that rotation at the contest host's discretion with no penalty to their score.
- VI. At the time of the contest, plans and instructions will be provided to contestants.
- VII. Time limits will be set for each rotation and announced at the contest site.
- VIII. The sponsoring school has the option to include safe work habits as part of the scorecard of up to 10% of the total points possible in that specific skill event. After a warning, the sponsoring school reserves the right to remove any contestant that violates accepted safety practices that endanger themself or others in the contest.
- IX. No unauthorized notes, printed materials, or tools may be used in any portion of the contest. Contestants found in violation will be disqualified from contest.
- X. While the contest is in progress, contestants shall not communicate with anyone but the judges. Any observed communications other than with the judges may result in disqualification of the individual or team.
- XI. Completed projects will be evaluated visually and may include nondestructive and/or destructive testing.
- XII. Host site will provide all plans, tests and written documents no later than 2 weeks after the contest is completed to all participating teams.

Contest Area Descriptions:

- XIII. Welding Application (200 points)
 - A. *Overview*: Contestants will be supplied plan sets at the contest site which outline the handson portion of the contest. These plan sets will be basic, three view, shop drawings which
 incorporate welding symbols and procedures. Contestants will be required to interpret the
 drawings and weld symbols to configure their projects following the described welding
 symbols, procedures and measurements. Projects will be submitted at the end of the
 prescribed time period for evaluation by the judges. A total of four process areas will be
 completed scored at 50 points per process.
 - B. Welding Processes: As outlined in the Contest Scope, there are six processes described as competency areas for the contestants. They are SMAW, GMAW, FCAW, GTAW, OFW and the Cutting Processes. The possible cutting processes include Plasma Arc Cutting (PAC), Oxy-fuel Cutting (OFC), and Air Carbon Arc Cutting/Gouging (CAC). Contestants will have projects which incorporate a minimum of three of the six processes. Cutting may comprise a maximum of one of the four required exercises. Rotations will be set up by the host committee.
 - C. Base Metals: Contestants may weld mild steel, aluminum and/or stainless steel.
 - D. *Filler Metals*: Contestants must be able to weld with a variety of filler metals that correspond to the proper welding process and base metals.
 - E. Welding Positions: Contestants will weld in the flat (1G and 1F), horizontal (2G and 2F), vertical (3G and 3F) and overhead (4G and 4F) positions.
 - F. *Possible Joint Configurations*: Joint configurations may include butt joints, corner joints, lap joints, edge joints, and/or tee joints that may include plate-to-plate, pipe-to-pipe connections.
 - G. *Possible Welds*: Contestants must be prepared to weld: bevel-groove welds, fillet welds, square groove welds, and /or v-groove welds.
 - H. Welding Equipment/Machines: Welding equipment may be obtained from a variety of sources and may include transformer, transformer/rectifier, generators, and/or inverters.

XIV. Written Test (50 points)

A. A written test shall include questions and/or problems from the following areas:

1.	Safety	10 5 points
2.	Shielded Metal Arc Welding (SMAW)	10 5 points
3.	Oxy Fuel Welding (OFW)	10 5 points
4.	Gas Metal Arc Welding (GMAW)	10 5 points
5.	Flux Core Arc Welding (FCAW)	10 5 points
6.	Gas Tungsten Arc Welding (GTAW)	10 5 points
7.	Cutting Processes	10 5 points
8.	Welding Symbols	10 5 points
9.	Weld testing, inspection and metallurgy	10 5 points
10.	Welder Certification	10 5 points

- B. The test may be true-false and multiple choice in any combination. The test will be comprised of 50 questions valued at 2-points 1 point per question.
- C. The questions for the written test will come from the *Welding Skills* textbook written by Moniz. The latest two editions will be used.

XV. Tool & Supply Identification (50 points)

A. The Tool & Supply ID section shall be comprised of 50 items valued at 1 point each. These items are to be commonly used in the welding industry and shall come from the approved listing of items (See Appendix). Every effort shall be made to have the actual item on display as opposed to pictures. Response method shall be matching, alphabetical list, or multiple choice...no fill-ins.

XVI. Weld Testing/Inspection (50 points)

- A. *Overview*: Contestants will evaluate weld samples utilizing visual testing methods (VT). Weld samples will be evaluated and compared to sections of the AWS D1.1 code for acceptability or rejection. Weld samples and appropriate code sections will be provided by the host committee. Contestants will also need to be familiar with common nondestructive testing (NDT) methods. This contest area will be a practical lab exercise whereby the contestants visit stations and provide responses on an answer sheet provided by the host committee. This will consist of 25 questions valued at 2 points per question.
- B. Nondestructive Testing (NDT): Contestants should be able to identify common NDT methods by photograph or real physical examples. The following methods may be included in this contest area: Visual Testing (VT), Dye Penetrant testing (PT), Ultrasonic Testing (UT), Radiographic Testing (RT) and Magnetic Particle Testing (MT). Questions will include both visual identification, as well as some basic knowledge questions about the testing methods.
- C. Visual Testing (VT): Contestants should be able to identify and measure the following surface indications: various forms of porosity, overlap/cold lap, undercut, cracks and inclusions. Upon identification, students should be able to measure these indications and reference the appropriate code section to determine whether the indication is an actual defect that would constitute rejection and repair. Code examples will be provided by the host committee and be based on the AWS D1.1 Structural Welding Code.

XVII.—Job Portfolio and Application (50 points)

A. Overview: All contestants will submit a digital job portfolio to the judging committee. The portfolio must be submitted to the contest host by 11:59 p.m. on the Wednesday immediately prior to the contest to allow ample time for the portfolios to be graded. Each contestant will submit his or her portfolio as a pdf. Any portfolios submitted in another format will be disqualified. Additionally, contestants will complete a sample job application onsite as one of the rotations.

- B. Portfolios: (35 points) Portfolios will consist of the following components: Title Page, Table of Contents, Letter of Introduction, Resume, Letter of Recommendation, and Supporting Evidence. All components must follow current, professional standards. Supporting Evidence will use the current FFA Proficiency Photo Pages. See rubric on page 7 for additional scoring information.
- C. Job Application: (10 points) A sample job application will be completed as one of the rotations at the contest site. These applications are intended to reflect the practice of handwriting an application as is found in many vocational/trade situations. Contestants should be able to write legibly and fully complete an application for employment. A 3"x5" card may be handwritten ahead of time to use as a reference during this rotation. The only supplemental information that may be written are: references names, addresses, phone numbers, place of employment address and place of employment phone number. See rubric below for additional scoring information.

Rubric:

-Application Form	10	9-10 Points No spelling and/or grammatical errors Neat and legible All sections are complete Follows instructions and uses proper employment format Contains relevant, descriptive	7-8 Points Occasional spelling and/or grammatical errors Predominately neat and legible Many sections are complete Follows instructions and uses proper employment format	Fersistent spelling and/or grammatical errors Mostly neat and legible Most sections are complete Follows most instructions Lacks relevant	3-4 Points Frequent spelling and/or grammatical errors Mostly disorganized and illegible Many sections are incomplete Does not follow Instructions Lacks relevant	1-2 Points Constant spelling and/or grammatical errors Disorganized and illegible Incomplete Does not follow Instructions Lacks relevant information
Job Applicati		employment format Contains relevant,	Follows instructions and uses proper employment format Contains relevant information Generally consistent with Resume and	Follows most instructions Lacks relevant information Mainly consistent with Resume and Letter of	 Does not follow Instructions 	Instructions Lacks relevant
			Letter of Introduction	Introduction		

D. Math Calculations: (5 points): The Math Calculations will consist of five basic math problems, which could include addition, subtraction, multiplication and dividing whole numbers, fractions, and decimals. All math problems will relate to the welding industry. Host school will provide basic four-function calculators for every student in each rotation. Contestants may utilize their own four-function calculators however cell phone calculators are prohibited. Each calculation is worth 1 point.

XVIII. Applied Skills and Knowledge (50 points)

Contestants will be tested on skills applicable in the welding field. Examples may include the following:

- A. Using a steel weight chart
- B. Calculating a bill of materials with a limit of 3 items/parts to calculate
- C. Interpreting a set of plans for materials used, lengths, and dimensions
- D. Using machine owners' manuals to derive parts needed, maintenance procedures, setup procedures, etc.
- E. Determining dimensions and materials from projects and assemblies

F. Complete a job application. Contestants should be able to write legibly and fully complete an application for employment. A 3"x5" card may be handwritten ahead of time to use as a reference during this rotation.

There shall be a total of 25 questions worth 2 points each for this area with a total of 50 points possible. If the Job Application component is used, there will only be 20 questions worth 2 points each as the Job Application shall be worth 10 points using the following rubric.

Job Application Rubric:

Contest Reference Material

The Procedure Handbook of Arc Welding,	AWS A3.0 (Terms and Definitions) and AWS A2.4
by Lincoln Electric Company, Cleveland, Ohio.	(Symbols), American Welding Society.
www.lincolnelectric.com	www.aws.org
The Lincoln Electric Company	American Welding Society
22801 St. Clair Ave.	550 N.W. LeJeune Road
Cleveland, OH 44117	Miami, Florida 33126
Phone: 216-481-8100	Phone: 800-443-9353 or 305-443-9353
The Educational Instructor's Package,	Welding Skills, by Moniz
by Miller Electric Manufacturing Co.	www.atplearning.com
<u>www.millerwelds.com</u>	American Technical Publishers
Miller Electric Manufacturing Co.	10100 Orland Parkway #200
1635 W. Spencer St.	Orland Park, IL 60467
P.O. Box 1079	Phone: 708-957-1100
Appleton, WI 54912-1079	
Phone: 920-734-9821 Miller.	
AWS D1.1 Structural Welding Code Steel	AWS A2.4 Standard Symbols for Welding,
Section 6 - Inspection	Brazing, and Nondestructive Examination
www.aws.org	www.aws.org
American Welding Society	American Welding Society
550 N.W. LeJeune Road	550 N.W. LeJeune Road
Miami, Florida 33126	Miami, Florida 33126
Phone: 800-443-9353 or 305-443-9353	Phone: 800-443-9353 or 305-443-9353

Ag Welding Contest Portfolio Rubric Exemplary Effective Acceptable **Developing** Poor Missing **Points Points** 2 Points 1 Point 0 points ● Student Name Missing any information in column one Chapter Name Additional graphics - Advisor Name added to the page 2 Contest Name Spelling and/or Contest Location grammatical errors found ● Date of Contest All above information centered 2 Points 1 Point 0 points Proper format and must Missing any information include: in column one -Letter of Introduction ● Does not follow proper - Resume 2 **Table Of Contents** -Letter of format Recommendation -Supporting Evidence #1 -Supporting Evidence #2 -Supporting Evidence #3 9-10 Points 7-8 Points 5-6 Points 3-4 Points 1-2 Points 0 points ● Properly addressed to a ● Not addressed to a Properly addressed to Attempts to properly Improperly addressed address to a local local business a local business local husiness Frequent spelling husiness ● No spelling and/or Occasional spelling Constant spelling and/or grammatical grammatical errors and/or grammatical ■ Regular spelling and/or grammatical errors and/or grammatical ■ Unique, detailed letter ■ Vague letter with which is well-stated, clear ● Descriptive letter elementary Purpose of letter is unclear 10 and concise with advanced - Generic letter with vocabulary Continuously basic vocabulary vocabulary ◆ Correctly reflects attached Often contradicts contradicts attached Often aligns with ■ Mostly aligns attached resume resume attached resume with attached Visually appealing and Makes an attempt to Does not follow resume follows business format Frequently follow business business format follows business ● Mostly follows format ● Contains a valid signature - Contains no signature business format format ● Contains a valid signature ● Contains a valid signature ● Contains a valid signature 9-10 Points 7-8 Points 5-6 Points 3-4 Points 1-2 Points 0 points ■ No spelling and/or Occasional spelling ■ Regular spelling Frequent spelling Constant spelling grammatical errors and/or grammatical and/or grammatical and/or grammatical and/or grammatical errors errors errors errors Visually appealing Visually appealing Attempts visual appeal Lacks visual appeal Lacks visual appeal Has consistent fonts, titles, spacing and formatting Has nearly consistent Attempts consistent Fonts, titles, spacing ◆ Fonts, titles, spacing and formatting are fonts, titles, spacing fonts, titles, spacing and and formatting are - Logically and 10 and formatting often different inconsistent formatting chronologically organized Logically but not - Inconsistent logical and Disorganized Disorganized - Follows Business Format chronologically chronological ■ Makes An Attempt To ● Does Not Follow organized organization Follow Rusiness **Business Format** - Follows Business Format - Makes An Attempt To Format Follow Business Format

CATA Curricular Activities Code Agricultural Welding 2 Points 1 Points 0 Points ● Dated current letter of - Does not contain a date Author is recommendation within related to ● Date printed is beyond the last year contestant one year from the contest Author of letter is not date 2 related to contestant -Letter content is regarding - Letter is relevant to the a topic not relating to the welding and/or welding and/or construction industry construction industry - Contains a valid signature ● Does not contain a valid signature 1 Point 0 Points 3 Points 2 points Supporting evidence Supporting evidence Supporting evidence includes one includes one includes one ◆ The current photograph. photograph. photograph. State 3 # **Proficiency** ● Picture is clear, of - Picture is mostly clear ■ Picture is blurry and photo page high quality and taken difficult to see. It is and taken in either the is not used in the landscape taken in either the landscape or portrait position orientation landscape or portrait orientation ■ The page uses the ◆ The Page uses the current state proficiency current state proficiency ■ The page uses the photo page template photo page template current state proficiency photo page template -Contains a well written - Contains a basic description less than 500description less than -Contains a vague characters which contains 500-characters which description less than contains regular spelling no spelling and/or 500-characters which grammatical errors and and/or grammatical contains constant errors, and some uses technical, advanced spelling and/or vocabulary to describe technical, advanced grammatical errors and uses technical, what is occurring in the vocabulary to describe what is occurring in the advanced vocabulary to photograph 3 describe what is photograph occurring in the photograph **Disqualifications:** • File is sent in a format other than a PDF • One contestant's portfolio is sent in multiple files Comments/Recommendations:

Master Identification List

			Tractor racingle				
1	12 point socket	29	cutting torch	<i>57</i>	magnetic square	<i>85</i>	straight shank twist drill
2	6 point socket	<i>30</i>	diagonal cutters	<i>58</i>	MIG - contact tip	86	tank/bottle wrench
3	adjustable end wrench	<i>31</i>	dividers	<i>59</i>	MIG - diffuser	<i>87</i>	tape measure
4	Allen wrench	<i>32</i>	drift punch	<i>60</i>	MIG - liner	88	taper shank twist drill
5	aluminum	33	Duct Tape®	61	MIG - nozzle	89	TIG - back cap
6	angle iron	34	ear plugs	62	MIG gun	90	TIG - collet
7	ball pein hammer	<i>35</i>	electrode - 6010	63	paint pen	91	TIG - collet body
8	bar clamp	<i>36</i>	electrode - 6011	64	pencil	92	TIG - cup
9	bench grinder	<i>37</i>	electrode - 7018	<i>65</i>	pliers - combination	93	TIG - cup gasket
10	bench vise	38	electrode - 7024	66	pliers - welder's	94	TIG - gas lens
11	black pipe	<i>39</i>	electrode holder or stinger	67	protractor	95	TIG torch
12	bolt, National Coarse	40	filter lens #10	68	pry or alignment bar	96	tip cleaner
13	bolt, National Fine	41	filter lens #5	69	ratchet	97	torch handle or butt
14	brazing rod	42	flashback arrestor	<i>70</i>	rectangular tubing	98	try square
15	calipers	43	flat bar	71	regulator - acetylene	99	Tungsten - 2% Ceriated
16	carbon arc gouging electrode	44	flowmeter	72	regulator - oxygen	100	Tungsten - 2% Lanthanated
17	carbon arc gouging torch	45	framing square	73	RG-45 filler rod	101	Tungsten - 2% Thoriated
18	C-clamp	46	gas welding goggles	74	round nose chisel	102	Tungsten - pure
19	center punch	47	grinder wheel	<i>75</i>	roundstock	103	Vise-Grip® C clamp
20	channel iron	48	ground clamp	76	safety glasses	104	welding cable
21	chipping hammer	49	Grub screw	<i>77</i>	scribe or scratch awl	105	welding gloves
22	clear cover lens	<i>50</i>	H-beam	<i>78</i>	sledge hammer	106	welding helmet
23	cold chisel	<i>51</i>	hex nut	<i>79</i>	sliding Tee bevel	107	welding tip
24	combination end wrench	<i>52</i>	hose - acetylene	<i>80</i>	soapstone	108	welding wire - core
25	combination square	<i>53</i>	hose - oxygen	81	spark lighter	109	welding wire - solid
26	compass	54	I-beam	82	speed square	110	wire brush
27	countersink	<i>55</i>	locking pliers	83	square tubing		
28	cutting tip	56	locking welding clamp	84	stainless steel		