HOBART
FILLER METALS

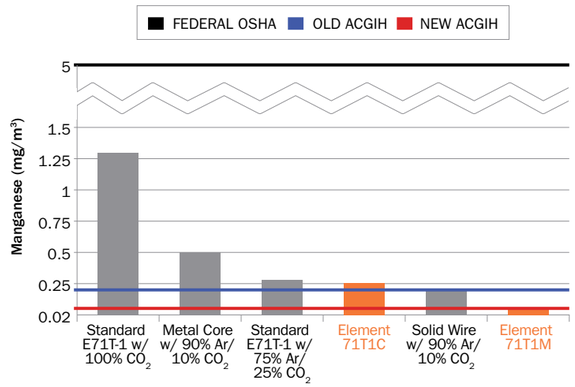
Hobart® Element™

Low Manganese Filler Metals

Hobart Brothers is excited to offer a new line of filler metals unrivaled in the marketplace: the Element™ family of low manganese flux-cored wires. Our engineers designed these products with two key factors in mind: compliance and performance. Element™ wires can help you meet increasingly-stringent environmental regulations for the manufacturing and fabrication industries – and ensure the best operability and productivity.

Used in combination with industry-leading fume extraction products from Miller Electric Mfg. Co. and Bernard, Element™ wires can help you gain an edge in quality and compliance.

Time Weighted Average of Manganese from Air Quality Sampling with 50% Arc on Time*



* Values based on controlled laboratory testing. Due to the number of variables involved, actual results will vary from application to application.

Background of Emissions Regulatory Changes

Over the years, regulatory bodies have enacted stricter regulations and recommendations for the acceptable levels of manganese in weld fume. Currently, OSHA has a Permissible Exposure Limit (PEL) of 5 mg/m³ for manganese fume. Certain states have endorsed more stringent regulations (see graphic below). The ACGIH has reduced its recommended Threshold Limit Value (TLV®) for manganese from .2 mg/m³ to .1 mg/m³ for inhalable particulate and .02 mg/m³ for respirable particulate.

Current Manganese Exposure Regulations and Recommendations			
Regulations (Legally Enforceable in United States)		Recommendations (Not Legally Enforceable at This Time)	
Federal OSHAS (PEL)	State OSHA (PEL)	NIOSH (REL)	ACGIH (TLV®)
5 mg/m³ Ceiling	Varies by state, see map	1 mg/m³ TWA 3 mg/m³ STEL	.1 mg/m³ inhalable TWA .02 mg/m³ respirable TWA

Steps Toward Manganese Emissions Compliance

Per OSHA Rule 29 CFR 1910.1000(e):

Administrative or engineering controls must first be identified and implemented whenever feasible to achieve compliance with the PEL. When such controls are not feasible to achieve compliance, personal protective equipment, respirators, or any other protective measures must be used to keep employees' exposure within the PEL.

STEPS TOWARDS COMPLIANCE				
Step One: Administrative or Engineering Controls				Step Two: Personal Protective Equipment
Process or Behavioral Change			Engineered Solutions	
Options to Reduce Manganese Through Filler Metal Selection				
Good	Better	*Best*		
Standard Filler Metal + Mixed Gas (instead of CO_2)	Low Manganese Filler Metal (Element™) 	Low Manganese Filler Metal + Mixed Gas (Element 71T1M, 71M, 70M, 81K2M, and 70C6)	1. Miller FILTAIR™ Fume Extraction Systems 2. Bernard FILTAIR™ Fume Extraction MIG Gun 	Miller Powered Air Purifying Respirators (PAPR) 

FabCO® Element™ 71T1C and FabCO® Element™ 71T1M

Features

- Enhanced out-of-position capability
- Low spatter and fume
- Low manganese emissions
- Enhanced slag release

Benefits

- Increases operator appeal
- Improves operator comfort and productivity
- Assists with conformance to environmental regulations
- Reduces clean-up time and risk of inclusions

Applications

- Ship building – High deposition and excellent out-of-position capability offer enhanced weld quality while increasing productivity.
- Heavy equipment – Low spatter and enhanced slag release coupled with the high deposition potential of the products help to reduce pre- and post-weld clean-up operations. This leads to faster travel speeds and higher productivity.
- Structural – Low hydrogen reduces the risk of hydrogen induced cracking.
- General fabrication – Increased operator appeal and enhanced out-of-position capability facilitate excellent weld quality over a broad range of applications.

	HOBART ELEMENT™ 71T1C		HOBART ELEMENT™ 71T1M	
	Typical Weld Metal Chemistry*			
	100% CO_2	AWS Spec.	75% Ar/25% CO_2	AWS Spec.
Carbon	0.057	0.120	0.052	0.120
Manganese	0.202	1.750	0.210	1.750
Phosphorus	0.010	0.030	0.011	0.030
Sulphur	0.012	0.030	0.012	0.030
Silicon	0.367	0.900	0.408	0.900
Nickel	0.450	0.500	0.454	0.500

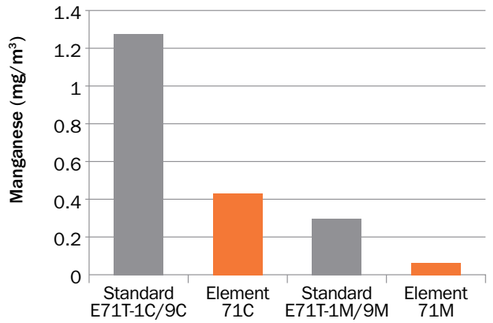
Note: AWS specification single values are maximums unless otherwise noted

	Typical Diffusible Hydrogen*			
	100% CO_2	AWS Spec.	75% Ar/25% CO_2	AWS Spec.
(Gas Chromatography)	5.1 ml/100g	8.0 ml/100g	6.0 ml/100g	8.0 ml/100g
	Typical Mechanical Properties*			
	100% CO_2	AWS Spec.	75% Ar/25% CO_2	AWS Spec.
Tensile Strength	72,000 psi (460 Mpa)	70,000-95,000 psi (460-670 Mpa)	73,000 psi (503 Mpa)	70,000-95,000 psi (460-670 Mpa)
Yield Strength	62,000 psi (427 Mpa)	58,000 psi (390 Mpa) Minimum	62,000 psi (427 Mpa)	58,000 psi (390 Mpa) Minimum
Elongation % in 2" (50mm)	29.80%	22% Minimum	29.00%	22% Minimum
	Typical Charpy V-Notch Impact Values (As Welded)*			
CVN Temperatures	100% CO_2	AWS Spec.	75% Ar/25% CO_2	AWS Spec.
Avg. at 0° F (-18° C)	85 ft-lbs (115 Joules)	20 ft-lbs (27 Joules) Minimum	84 ft-lbs (114 Joules)	20 ft-lbs (27 Joules) Minimum

*** The information contained or otherwise referenced herein is presented only as "typical" without gaurantee or warranty, and Hobart Brothers Company expressly disclaims any liability incurred from any reliance thereon. Typical data are those obtained when welded and tested in accordance with AWS A5.20 specification. Other test and procedures may produce different results. No data is to be construed as a recommendation for any welding condition or technique that has not been tested in accordance with AWS A5.20 specification.**

FabCO® Element™ 71C and FabCO® Element™ 71M

Time Weighted Average of Manganese from Air Quality Sampling with 50% Arc-On Time*



* Values based on controlled laboratory testing. Due to the number of variables involved, actual results will vary from application to application.

- A more economical low manganese alternative for applications requiring an E71T-1/-9 type product
- Excellent impact properties down to -40°F (-40°C).
- Provides a 60-80% reduction in manganese in the weld fume.
- Mixed gas products can be used with up to 90% Ar/balance CO2 further reducing spatter and emissions
- Well suited for the shipbuilding industry (both all-position wires have ABS 3YSA approval).
- Offers low hydrogen and spatter levels with excellent weldability – great for many additional industries.

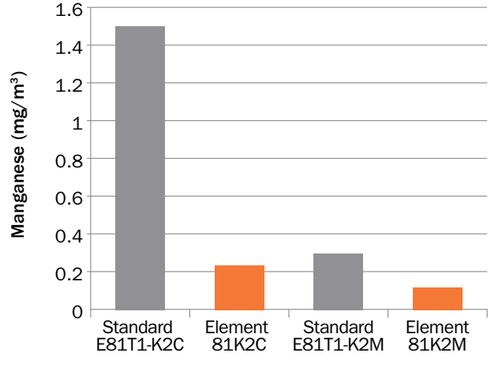
	Element™ 71C	Element™ 71M
Ave. at -20°F (-30°C)	66 ft·lbs (89 Joules)	67 ft·lbs (91 Joules)
Ave. at -40°F (-40°C)	52 ft·lbs (71 Joules)	40 ft·lbs (54 Joules)

FabCO® Element™ 81K2C and FabCO® Element™ 81K2M

- Provides a low manganese alternative for applications requiring an E81T1-K2X-type product.
- Meets all of the physical and chemistry requirements for the E81T1-K2X class of wires with the exception of manganese.
- Provides a 60-80% reduction of manganese in the weld fume.
- Appeals to industries requiring low diffusible hydrogen levels and excellent impact properties.
- Excellent all-position capabilities
- Both have ABS 3YSA approval.

	Element™ 81K2C	Element™ 81K2M
Ave. at -20°F (-30°C)	81 ft·lbs (110 Joules)	76 ft·lbs (103 Joules)
Ave. at -40°F (-40°C)	57 ft·lbs (77 Joules)	66 ft·lbs (89 Joules)

Time Weighted Average of Manganese from Air Quality Sampling with 50% Arc-On Time*



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FabCOR® Element™ 70C6

Features

- Extremely low manganese emissions
- Provides higher deposition rates than solid wires
- Formulated for improved silicon removal
- Balanced arc characteristics (smooth & penetrating)

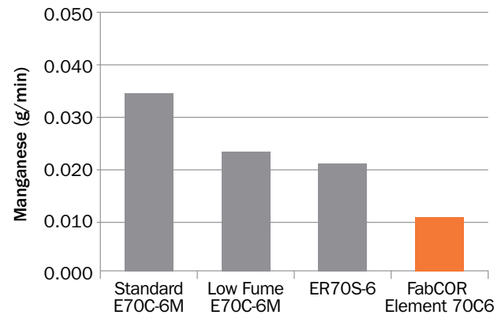
Benefits

- Assists with conformance to environmental regulations
- Allows increased travel speed and productivity
- Helps reduce clean-up time and improve productivity
- Helps maintain consistent weld appearance and quality

Applications

- Single or multi-pass welding
- General fabrication
- Heavy equipment
- Railcar
- Shipbuilding

Manganese Fume Generation Rate



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HOBART ELEMENT™ 70C6			
	Typical Weld Metal Chemistry*		
Weld Metal Analysis	**75% Ar/25% CO_2**		**AWS Spec.**
Carbon	0.05		0.12
Manganese	0.53		1.75
Phosphorus	0.009		0.030
Sulphur	0.012		0.030
Silicon	0.80		0.90
Nickel	0.45		0.50

Note: AWS specification single values are maximums unless otherwise noted

	Typical Diffusible Hydrogen*		
Hydrogen Equipment	**75% Ar/25% CO_2**	**90% Ar/10% CO_2**	**AWS Spec.**
(Gas Chromatography)	2.0 ml/100g	≤ 4.0 ml/100g	4.0 ml/100g Maximum
	Typical Mechanical Properties* (As Welded)		
Mechanical Tests	**75% Ar/25% CO_2**	**90% Ar/10% CO_2**	**AWS Spec.**
Tensile Strength	79,000 psi (545 MPa)	84,000 psi (579 MPa)	70,000 psi (490 MPa) Minimum
Yield Strength	68,000 psi (469 MPa)	71,000 psi (490 MPa)	58,000 psi (390 MPa) Minimum
Elongation % in 2* (50 mm)	23%	23%	22% Minimum
	Typical Charpy V-Notch Impact Values* (As Welded)		
CVN Temperatures	**75% Ar/25% CO_2**	**90% Ar/10% CO_2**	**AWS Spec.**
Avg. at -20 F (-30 C)	35 ft·lbs (47 Joules)	20 ft·lbs (27 Joules)	20 ft·lbs (27 Joules) Minimum

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Available Diameters and Packaging

Product	AWS Class	Diameter	Packaging	Part Number
FabCO® Element™ 71T1C	E71T-1C H8, -9C H8, -12C H8	.045"	33 lb Fiber Spool	S292112-029
		.052"	33 lb Fiber Spool	S292115-029
		1/16"	33 lb Fiber Spool	S292119-029
		1/16"	60 lb Coil	S292119-002
FabCO® Element™ 71T1M	E71T-1M H8, -9M H8	.045"	33 lb Fiber Spool	S294112-029
		.052"	33 lb Fiber Spool	S294115-029
		1/16"	33 lb Fiber Spool	S294119-029
		1/16"	60 lb Coil	S294119-002
FabCO® Element™ 71C	E71T1-GC H8	.045"	33 lb Fiber Spool	S297912-029
		.052"	33 lb Fiber Spool	S297915-029
		1/16"	33 lb Fiber Spool	S297919-029
FabCO® Element™ 71M	E71T1-GM H8	.045"	33 lb Fiber Spool	S294712-029
		.052"	33 lb Fiber Spool	S294715-029
		1/16"	33 lb Fiber Spool	S294719-029
FabCO® Element™ 81K2C	E81T1-GC H8	.045"	33 lb Fiber Spool	S292412-029
		.052"	33 lb Fiber Spool	S292415-029
		1/16"	33 lb Fiber Spool	S292419-029
FabCO® Element™ 81K2M	E81T1-GM H8	.045"	33 lb Fiber Spool	S294412-029
		.052"	33 lb Fiber Spool	S294415-029
		1/16"	33 lb Fiber Spool	S294419-029
FabCOR® Element™ 70C6	E70C-6M H4	.045"	33 lb Fiber Spool	S294612-029
		.045"	60 lb Coil	S294612-002
		.045"	500 lb X-Pak	S294612-050
		.052"	33 lb Fiber Spool	S294615-029
		.052"	60 lb Coil	S294615-002
		1/16"	33 lb Fiber Spool	S294619-029
		1/16"	60 lb Coil	S294619-002

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