

AUTOGENOUS DEVICES

气焊设备

OPERATING INSTRUCTIONS Page 2

操作说明书 第 28 页

ENGLISH

中文

Revision history

Revision	Date	Comments, affected sections/chapters	Product responsibility
01	2017-01-25	Reworking of entire document	QS

AUTOGENOUS DEVICES

OPERATING INSTRUCTIONS

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AUTOGENOUS DEVICES

OPERATING INSTRUCTIONS

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1 General Information

1.1 About these operating instructions

The purpose of these operating instructions is to enable safe use of the autogenous torches and heating trays for the intended purpose and, moreover, to prevent risks, reduce downtimes and increase the reliability and service life of the autogenous devices through compliance with the information contained.

These operating instructions include all the information required for use as intended by trained personnel. Among other things, they contain information about commissioning, operation, maintenance and disposal of autogenous devices. For further information or in cases of doubt, please contact the manufacturer.

Please note the following points:

- » The operating instructions form part of the autogenous torches.
- » They must be available to the user at all times.
- » These operating instructions do not replace the work instruction for the processes in question.
- » The information in these operating instructions is binding in nature.
- » Everyone who uses the autogenous torches presented in these operating instructions must have read and fully understood the entirety of these operating instructions before use.
- » Follow the instructions, prohibitions and commands in the operating instructions at all times.
- » Pay attention to all the safety information.

1.2 Supplementary documents

Special work instructions are available for the different applications of the autogenous torches described in these operating instructions in connection with the execution or preparation of a THERMIT® weld or with other procedures. The work instruction for the particular THERMIT® welding process includes important information on execution of the welding process and must be observed when using the autogenous torches.

1.3 Liability

The user is responsible for failure to comply with the operating instructions. The warranty does not cover damage to the autogenous torches presented in these operating instructions or to accessories or disruptions to business where said damage or disruption is the result of failure to comply with the operating instructions or misuse by the user. Unauthorised conversion or modification of the autogenous torches or accessories are not permitted and invalidate the warranty.

1.4 Copyright



These operating instructions are protected by Elektro-Thermit GmbH & Co. KG copyright.

1.5 Warranty

The legally stipulated obligation governing the warranty period applies.

2 Safety

2.1 Explanation of symbols

Symbol	Description
	Warning: risk of injury
	General note for helpful tips and additional information

2.2 Safety instructions

This chapter contains all the information relating to safety. Read all safety information thoroughly before use and follow it carefully when using the device.

- 1) The use of autogenous torches and handling fuel gases and oxygen requires specialist knowledge and compliance with these operating instructions. Operating personnel should receive training and safety instruction.
- 2) Before starting up, take note of possible dangers at the workplace, e.g. of fire risk due to highly flammable solids, gases or liquids. When heating, care must be taken that the resulting heat dissipates or rises upwards. It is recommended to cool the heat conducting material.
- 3) A mixture of fuel gas and oxygen or fuel gas and air must not be allowed to escape from the torch **unignited**.
- 4) All autogenous torches meet the requirements of EN ISO 5172 and have been manufactured and tested in accordance with the latest technical standards. No modifications or repairs to the torches may be carried out without the approval of the manufacturer.
- 5) Improper use or use for anything other than the intended purpose can lead to risks for the operator and others and may cause damage to the torch and the system.
- 6) The operator has a duty to provide sufficient personal protective equipment (PPE) for the operating personnel.
- 7) The accident prevention regulations of the relevant insurer are binding for the execution of all work.
- 8) It is not permitted to use the presented products in combination with competitor products.

The following standards apply to the autogenous torches and associated equipment:

- » EN ISO 5172:2006 + A1:2012 + A2:2015 Gas welding equipment - Blowpipes for gas welding, heating and cutting - Specifications and tests
- » EN ISO 3821:2010 Gas welding equipment - Rubber hoses for welding, cutting and allied processes
- » EN 560:2005 + AC:2007 Gas welding equipment - Hose connections for equipment for welding, cutting and allied processes
- » EN 561:2002 Gas welding equipment - Quick-action coupling with shut-off valves for welding, cutting and allied processes
- » EN 730-1:2002 Gas welding equipment - Safety devices - Part 1: Incorporating a flame (flashback) arrestor

- » EN 730-2:2002 Gas welding equipment - Safety devices - Part 2: Not incorporating a flame (flashback) arrestor
- » EN 16436-1:2014 + A1:2015 Rubber and plastics hoses, tubing and assemblies for use with propane and butane and their mixture in the vapour phase

3 Product description and use characteristics

3.1 Structure and description of the autogenous torches

3.1.1 Types

An assembled, ready-to-use autogenous torch consists of a handle piece HESA type SL/56, a SMARTWELD RECORD (observe separate operating instructions) or a needle valve and the corresponding torch insert. The torch insert is selected according to the application/purpose and connected to the respective handle piece using the terminal nut to give an operational autogenous torch. The various torch inserts are ready for use only after the individual cutting or heating nozzle or gouging tip has been installed.

3.1.2 Mixing systems

All the autogenous torches mentioned have the mixing system "injector mixer with suction action" (see section 5).

3.1.3 Propane/air mixture torch

Rail foot preheater and in-line torches are operated without oxygen and therefore have a needle valve instead of a handle. Start-up: The needle valve is to be opened. The fuel/air mixture must be ignited immediately with a suitable igniter. If an thermal detector system is installed, it must be actuated until the gas supply to the flame is maintained automatically. The needle valve must be closed for shutdown.

3.2 Proper use

3.2.1 Autogenous torches

The autogenous torches may only be used for the intended autogenous procedure.

3.2.2 Applications of the torch inserts

HESA cutting insert

Disconnecting rails and creating a defined weld gap in accordance with the THERMIT® welding process.

HESA preheating insert

Preheating rails and drying the casting system as a whole before performing a THERMIT® weld as per the work instruction for the respective welding process.

HESA straightening torch insert

Heat straightening of steel sheets and setting hot spots when straightening rails.

HESA flame gouger

Various flame gouging activities.

3.2.3 Fuel gases

There are a range of torch inserts for the various types of fuel gas for different applications. *(For details see section 12, operating data.)*

Possible fuel gases	Marking
Acetylene	A
Propane	P



Only those fuel gases which are marked on the respective torch insert may be used.

The autogenous torches may only be used for the procedure for which the respective torch insert is provided.

4 Connections and attachments

Before commissioning, the autogenous torch must be connected to a suitable supply of oxygen and gas. This is detailed in EN 560. All connecting parts must be checked for gas-tightness before each use. The actual commissioning of the torch, with ignition, may only take place if the system is gas-tight.

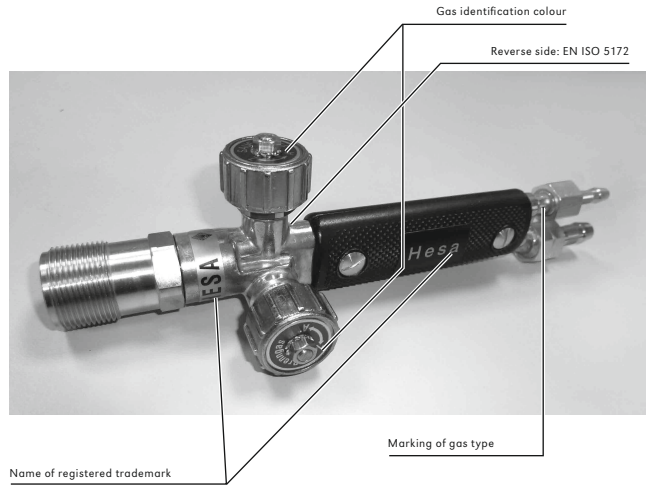
5 Marking

5.1 Explanation of the markings

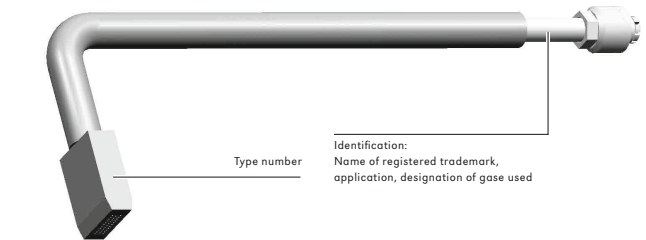
i	Injector mixer with suction action
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Type of gas	Designation code	Identification colour
Oxygen	O	blue green (USA)
Acetylene	A	red
Propane	P	red

5.2 Handle piece HESA type SL/56

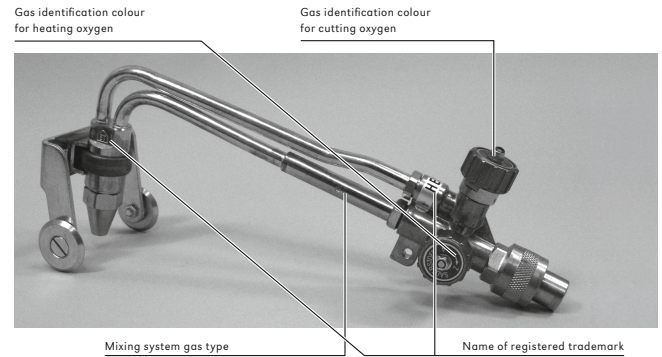


5.3 Preheating torch insert and heat straightening torch insert



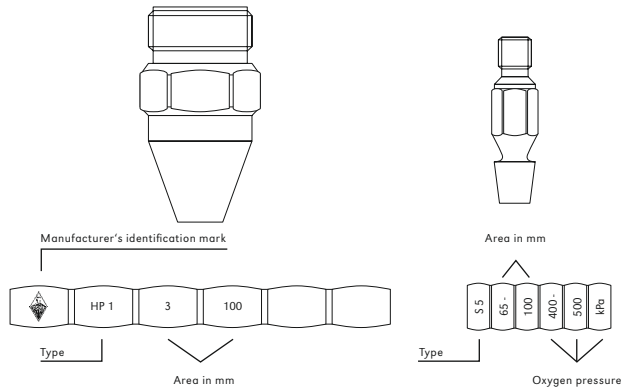
5.4 Cutting torch insert

The cutting torch insert shown here is just an example.



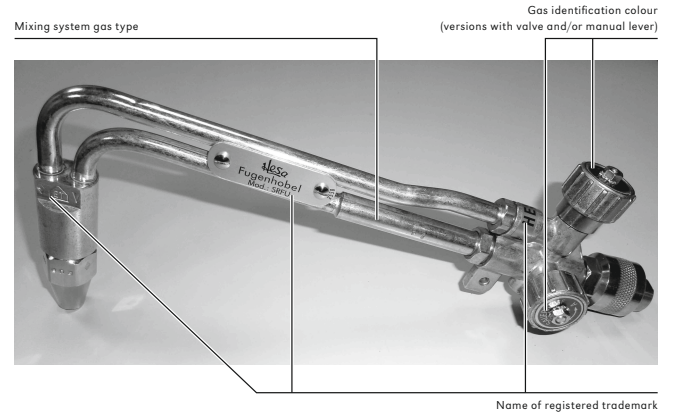
5.5 Marking to EN ISO 5172

Example: Cutting and heating nozzle for low-pressure torch.

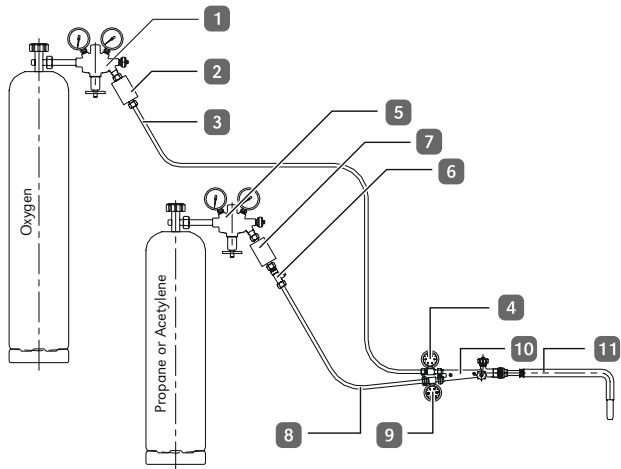


5.6 Flame gouger

The flame gouging insert shown here is just an example.



6 Overview structural diagram of autogenous technology



- 1 Pressure regulator for oxygen type HESA 70
- 2 Seal for oxygen (note national regulations)
- 3 Oxygen hose
- 4 Check gauge (optional)
- 5 Pressure regulator for fuel gas used, type HESA 70 (propane or acetylene; for acetylene, connector opposite to that shown in picture)
- 6 Hose pressure relief device or double-walled leakage gas safeguarding system (propane only)
- 7 Seal for fuel gas used (propane or acetylene)
- 8 Fuel gas hose (for either propane or acetylene)
- 9 Check gauge for fuel gas (optional)
- 10 Handle piece HESA type SL/56 or SMARTWELD RECORD
- 11 Autogenous torch insert

7 Commissioning

7.1 Preparations

- 1) Check that all threaded connections and seals are clean and undamaged.



Ensure that all parts coming into contact with oxygen are free of oil and grease! **Danger of explosion!**

- 2) The hoses (3 and 8) should be connected to the torch inlet (10) and/or to the pressure relief outlet (1 or 5) and/or to the tapping-off point safeguard (2 or 7) in accordance with EN ISO 3821. Only hoses and union nuts to EN 560 should be used.



The connection threads are country-specific.

When using hose couplings, these must comply with EN 561!

- 3) When abstraction off fuel gas, the use of safeguards in accordance with EN 730-1 and EN 730-2 is compulsory. We recommend also doing this to safeguard the oxygen tapping-off point.
- 4) The appropriate torch insert (11) for the handle piece HESA type SL/56 or the SMARTWELD RECORD (10) should be selected in accordance with the work to be carried out, e.g. heating, straightening, flame cutting or preheating, as per the THERMIT® welding process.

When installing the torch insert on the handle piece, ensure the parts and seals are clean and undamaged. The terminal nut on the torch insert (11) should be tightened by hand. If necessary, spanner can be used.

7.2 Preheating, straightening

7.2.1 Setting the operating pressures

The oxygen and fuel gas valves on the handle piece HESA type SL/56 or SMARTWELD RECORD (10) should initially be kept closed. The cylinder valves should be opened slowly; the adjusting screws on the pressure regulators (1 and 5) must be loose. Now, you need to set the operating pressures at the pressure regulators (1 and 5) by screwing in the respective adjusting screw until the operating pressure stated in the work instruction is reached or until the specifications on the torch inserts are reached. The operating pressures should be adjusted as necessary while the flame is burning.

7.2.2 Igniting and setting the torch flame

First, fully open the oxygen regulating valve on the handle piece HESA type SL/56 or on the SMARTWELD RECORD (10), then partially open the fuel gas regulating valve on the handle piece HESA type SL/56 or on the SMARTWELD RECORD (10). Ignite the outflowing gas mixture **immediately**. After ignition, adjust the operating pressures using the adjusting screws on the pressure regulators if necessary. The neutral flame required for welding works is set using the fuel gas valve only. First, set a surplus of fuel gas. Then restrict the flow of fuel gas until a very long, clearly delineated flame cone is achieved.

7.3 Flame cutting/flame gouging

7.3.1 Startsequence

The respective nozzle should be selected according to the work to be carried out and screwed into the torch head of the cutting insert (11) until it is gas-tight. Only use clean and undamaged HESA nozzles! Ensure the sealing surfaces on the nozzles and on the torch head are in perfect condition. If appropriate, fasten a guide carriage to the torch head, adjusting the distance between the nozzle and the workpiece surface in the process.

7.3.2 Setting the operating pressures

The oxygen and fuel gas valves on the handle piece (10) or on the cutting insert (11) should initially be kept closed. The cylinder valves should be opened slowly; the adjusting screws on the pressure regulators (1 and 5) must be loose. Now, you need to set the operating pressures at the pressure regulators (1 and 5) by screwing in the respective adjusting screw until the required operating pressure is reached or until the specifications on the torch inserts are reached. The operating pressures should be adjusted as necessary while the flame is burning.

7.3.3 Igniting and setting the torch flame

First, fully open the oxygen regulating valve on the handle piece (10), then fully open the heating oxygen valve on the cutting insert (11) before finally partially opening the fuel gas regulating valve on the handle piece (10). The outflowing gas mixture must be ignited **immediately**! A neutral flame should be set by adjusting the heating oxygen valve (11) and using the fuel gas regulating valve (10) (as for welding flame). Now fully open the cutting oxygen valve; adjust the oxygen pressure if necessary. Set the flame to neutral once more. Then close the cutting oxygen valve again.

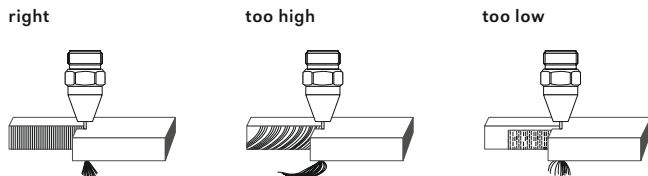
7.3.4 Special characteristic of flame cutting

Move the torch into position for the initial cut and use the heating flame to locally heat the workpiece to the ignition temperature, roughly bright red.



Do not melt the material causing it to burn or run off!

The cutting oxygen valve is then opened outside the position of the initial cut and the torch is moved in the cutting direction. You can tell if the cutting speed is correct based on the slag stream, horizontal sparking, the cutting noise and square cutting edges.



7.3.5 Special characteristic of flame gouging

For preheating, the gouging tip is inclined at an angle of 60° to 70° to the workpiece surface. The starting point is heated to ignition temperature using the heating flame. As soon as the surface starts to melt, the gouging tip is moved to an angle of 15° to 30° to the workpiece surface; at the same time, the oxygen valve for the gouging tip is slowly opened so that the jet of oxygen hits the heated surface in the direction of working. The forward movement must begin at the same time, and the flow of slag that forms must be driven evenly ahead of the gouging tip, with the edge of the gouging tip being positioned on the workpiece to be gouged or on the edge of the previously gouged joint piece. The joint width and depth can be influenced by the position of the gouging tip relative to the workpiece and by the acceleration or deceleration of the movement. Repeated gouging to a greater depth is needed if defects have formed.

8 Close down and disassembly

Closing down the autogenous torch uses the reverse sequence to that for ignition: first close the fuel gas regulating valve on the handle piece HESA type SL/56 or SMARTWELD RECORD (10), then close the oxygen regulating valve.

For the cutting torch and flame gouger, first close the cutting oxygen valve (11), then the fuel gas regulating valve, and finally close the oxygen regulating valve on the handle piece (10) and on cutting insert (11).

For longer interruptions to the work, all cylinder valves and tapping-point valves must also be closed. In this case, all pressure regulators and hoses should be relieved of pressure by opening the regulating valves on the handle piece HESA type SL/56 or SMARTWELD RECORD (10) and the cutting oxygen valve. The pressure regulators should then be relaxed by unscrewing the adjusting screws.

9 Notes for operation and maintenance

9.1 Maintenance

9.1.1 Cleaning the torches and nozzles

To make sure that functionality and safety are not impaired, the devices should be handled with care and protected from mechanical damage and contamination. Cutting and other nozzles should be kept clean, and should be cleaned where necessary using suitable nozzle cleaners and possibly also using a brass wire brush.



Do not enlarge the nozzle holes!

9.2 Fault

9.2.1 Damage to the torch

If the fittings and nozzles are not leak-tight, or in the case of damage caused by sustained torch backfire, melting at the mixing point, blocked injectors etc., take the torch out of service and do not operate it. Repairs must only be carried out by authorised repair workshops.

9.2.2 Torch backfire

This indicates a reduction in the outflow speed, e.g. caused by contamination of the nozzles owing to immersion in the weld pool or melt pool or caused by operator error. The flame enters the torch and goes out with a bang. Reignite the torch!

9.2.3 Sustained backfire

In this case, the flame penetrates further into the torch and continues to burn in the region of the mixing chamber. This makes a banging, whistling noise. In this case **immediately** close **both** regulating valves, for oxygen and fuel gas, on the handle piece HESA type SL/56 or SMARTWELD RECORD (10) **quickly and simultaneously**. In the case of sustained backfire, autogenous torches that have become hot should be cooled in water with flowing oxygen (with the oxygen valve open).

9.2.4 Flashback

Blowback of the flame into the torch and into the hoses and equipment connected upstream of the torch.

9.2.5 Gas backflow

Flow of the gas that is under higher pressure back into the hose of the gas that is under lower pressure. This can lead to flashback.

9.3 Suction test

The suction test should be carried out each time the torch is commissioned.

Close the outlet valve on the pressure regulator (5) for fuel gas. Now unscrew the fuel gas hose (8) on the handle piece HESA type SL/56 or SMARTWELD RECORD (10). Next open the oxygen regulating valve and the fuel gas regulating valve. Oxygen now flows out of the torch nozzle. Hold your fingertip on the fuel gas connection port on the handle piece HESA type SL/56 or on the

SMARTWELD RECORD. In the case of suction action, the fingertip will be noticeably drawn in. If no suction action is established, the torch insert must not be operated and must be checked/repared in an authorised workshop.

10 Service and repair

10.1 Repair workshop


Repairs may only be carried out by specialists in authorised repair workshops.

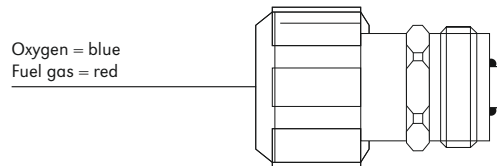
10.2 Spare parts

Only original spare parts guarantee flawless function and safety. It is not permitted to use HESA products in combination with competitor products. Lists of spare parts can be requested as needed.

10.3 Monoblock valves

The monoblock valves fitted are of identical design and require no maintenance. Damaged or leaky valves must be replaced. To do this, the valves should be unscrewed while in the open state. After cleaning the sealing surfaces, screw in a new monoblock valve with O-ring in place and tighten firmly (torque approx. 40 Nm).

 Important: Insert the correct label for gas marking in the recess in the handwheel!



10.4 Inspection

Following repair, the torch must be inspected thoroughly (see EN ISO 5172).

11 Disposal/recycling

This chapter contains all information necessary for the proper disposal of all components of the autogenous torches.



You must ensure that the autogenous torches and their components are disposed of in an environmentally responsible manner.

At the end of the service life of the autogenous torches, the operator must ensure that each component is disposed of in accordance with the regulations in force at that time.

12 Operating data

12.1 Oxygen and propane consumption of the ET autogenous torch

Torch type	Flow rate										Pressure			Note
	Oxygen = O		Propane = P				in bar		in kPa		O	P	P	
	l/h	l/min	l/h	l/min	kg/h	kg/min	O	P	O	P				
55-502	13,200	220	4,000	67	7.84	0.131	5.0	1.5	500	150				
55-502	9,900	166	3,000	50	5.88	0.098	4.0	1.5	400	150				
55-502	9,000	160	2,777	46	5.35	0.089	3.5	1.5	350	150				
55-502	8,400	140	2,545	42	4.99	0.083	3.0	1.5	300	150				
55-502	6,300	105	1,909	32	3.74	0.063	2.5	1.5	250	150				
65-504	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100				
65-508	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100				
85-160	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100				
85-507	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100				
85-660	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100				
85-665	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100				
95-502	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100				
95-506	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100				

Torch type	Flow rate						Pressure				Note
	Oxygen = O		Propane = P		in bar		in kPa		O	P	
	l/h	l/min	l/h	l/min	kg/h	kg/min	O	P			
551-503	7,800	130	2,295	39	4.5	0.075	4.5	1.0	450	100	
551-525	7,800	130	2,295	39	4.5	0.075	4.5	1.0	450	100	
551-526	11,700	195	3,315	56	6.5	0.109	2.5	1.5	250	150	
551-526	19,900	332	5,610	94	11.0	0.184	5.0	1.5	500	150	
551-537	18,000	300	6,000	100	11.76	0.196	5.0	1.5	500	150	
560-044	-	-	1,160	19	2.25	0.038	-	1.5	-	150	Propane only
560-051	-	-	2,000	34	4.0	0.067	-	1.5	-	150	Propane only
580-709	14,000	233	4,667	78	9.147	0.152	5.0	1.5	500	150	
30-560	2,880	48	960	16	1.882	0.031	5.0	1.5	500	150	Cutting oxygen: 6,000 l/h
30-560	1,920	32	640	10.7	1.245	0.021	4.5	1.0	450	100	Cutting oxygen: 6,880 l/h
551-541	3,520	59	1,020	17	2.0	0.033	5.0	1.5	500	150	
551-517	7,700	129	2,346	39.1	4.6	0.077	5.0	1.5	500	150	
30-565	2,809	46.8	557	9.29	1.092	0.018	6.0	1.5	600	150	
30-565	1,709	28.5	383	6.38	0.75	0.013	3.0	1.5	300	150	

12.2 Oxygen and acetylene consumption of the ET autogenous torch

Torch type	Flow rate				Pressure				Note
	Oxygen = O		Acetylene = A		in bar		in kPa		
	l/h	l/min	l/h	l/min	O	A	O	A	
30-529	2,820	47	2,820	47	2.5	1.0	2.50	100	
30-550	3,800	63.33	3,800	63.33	4.5	1.0	450	100	
95-505	2,520	42	2,520	42	4.5	1.0	450	100	
30-561	Preheating flame				4.5	1.0	450	100	Cutting oxygen: 6,400 l/h
	640	10.67	640	10.67					
551-513	3,400	57	2,750	46	4.5	1.0	450	100	

修订记录

修订	日期	备注、相关章节	责任部门
01	2017-1-25	修订整个文档	QS

气焊设备

操作说明书

发行人: Elektro-Thermit GmbH Co. & KG
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气焊设备 操作说明书

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1 一般信息

1.1 关于本操作说明书

本操作说明书旨在帮助用户安全、正确地使用本气炬和预热枪，以及在遵照其中信息的情况下，避免危险、减少停机时间并提高气焊设备的可靠性和使用寿命。

本操作说明书中包含了受训人员正确使用所需的全部信息。此外，其中还包含了有关调试、操作、维护和废弃处理本气焊设备的信息。如需了解更多信息，尤其是在存有疑虑时，请咨询制造商。

应注意以下内容：

- » 本操作说明书属于本气炬设备的一部分。
- » 必须可供用户随时查阅。
- » 本操作说明书无法取代相关工艺的作业指导。
- » 本操作说明书中的信息具有约束力。
- » 本操作说明书中所涉气炬的全部用户都应在使用之前，完整阅读本操作说明书并予理解。
- » 应时刻遵照本操作说明书中的指导、禁令和规定。
- » 应遵守所有的安全提示。

1.2 相关文档

在将本操作说明书中所介绍气炬与 THERMIT® 焊接方法的执行或准备过程以及其他作业方法相结合实现不同用途时，需遵照专门的作业指导。相应 THERMIT® 焊接方法的作业指导中包含了有关执行此种焊接方法的重要信息，在使用气炬时必须予以遵守。

1.3 责任

用户须对不遵守本操作说明书的行为承担责任。若因用户不遵守本操作说明书或错误使用，而导致本操作说明书中所涉气炬或配件受损或故障，将无法享受保修。禁止擅自改装或改动气炬或配件，否则概不负责。

1.4 版权保护



本操作说明书受 Elektro-Thermit GmbH & Co. KG 版权保护。

1.5 保修

遵照法定的保修义务。

2 安全

2.1 符号释义

符号	含义
	注意受伤危险
	有用技巧和补充的一般提示。

2.2 安全提示

本章提供了所有与安全相关的信息。使用前请完整阅读全部安全提示，并在使用过程中予以遵守。

- 1) 气炬的使用以及对燃气和氧气的处理都需要具备专业知识并遵守本操作说明书。操作人员需要经过培训并了解安全须知。
- 2) 调试前应注意工作场所可能出现的危险，例如因易燃的固体、气体或液体造成的火灾危险。加热时要注意，应让产生的热量散发出去或向上升起。建议在必要时对导热材料进行冷却。
- 3) 不可从气炬中喷出未经点燃的燃气-氧气混合物或燃气-空气混合物。
- 4) 所有气炬都符合 EN ISO 5172 的要求，并且是按照现有技术水平制造和检验。未经制造商批准，不得对气炬进行改动和修理。
- 5) 若不正确使用或不按规定使用，可能对用户和其他人员造成危险，以及导致气炬和系统损坏。
- 6) 用户应确保为操作人员提供充分的个人防护装备 (PPE)。
- 7) 执行各类作业时，都应以相关主管事故保险机构的事故预防规定为基础。
- 8) 禁止将所涉产品与竞争对手产品混用。

本气炬及其相关设备采用了如下标准：

- » EN ISO 5172: 2006 + A1: 2012 + A2: 2015 气炬设备 - 焊接、加热和切割用气炬 - 要求和检验
- » EN ISO 3821: 2010 气炬设备 - 焊接、切割和相关工艺用橡胶软管
- » EN 560: 2005 + AC: 2007 气炬设备 - 焊接、切割和相关工艺用设备和系统的软管连接
- » EN 561: 2002 气炬设备 - 带自动气体截止阀的焊接、切割和相关工艺用软管连接器
- » EN 730-1: 2002 气炬设备 - 安全装置 - 第 1 部分：带内置防回火阀

- » EN 730-2: 2002 气炬设备 - 安全装置 - 第 2 部分：不带内置防回火阀
- » EN 16436-1: 2014+A1: 2015 用于使用气态丙烷、丁烷及其混合物、带或不带内衬的橡胶和塑料软管以及软管管路

3 产品介绍和使用特征

3.1 气炬的结构和介绍

3.1.1 型号

可供使用并已装好的气炬由一个 HESA SL/56 型手柄、一个 SMARTWELD RECORD（注意专门的操作说明书）或针型阀以及相应的气炬枪组成。气炬枪需根据应用方法/设计用途选用，通过连接螺母与对应的手柄相连，得到可供使用的气炬。各种气炬枪都需要安装单独的割嘴、加热喷嘴或刨嘴后才可使用或应用。

3.1.2 混合系统

所有提及的气炬都拥有“具有射吸效应的喷射混合器”混合系统（参见章节 5）。

3.1.3 丙烷-空气混合气体气炬

预热枪和线性气炬均不使用氧气运行，因此使用针型阀替代手柄。调试：需要打开针型阀。应立即使用合适的点火器点燃燃气-空气混合气体。如果安装有熄火保护装置，应对其进行操作，直至气体供给能够自动保持火焰。如需停用，关闭针型阀。

3.2 按规定使用

3.2.1 气炬

本气炬仅允许用于规定的气焰焊割方法。

3.2.2 气炬枪的应用范围

HESA割炬

用于切割钢材。

HESA预热枪

在按照相关焊接方法的作业指导执行 THERMIT® 焊接方法时，预热或加热钢轨以及烘干整个浇注系统。

HESA 矫直气炬枪

在矫直钢轨时进行钢材加热矫直作业和设置加热点。

HESA 气刨

各种气刨作业。

3.2.3 燃气

针对不同的应用，为各种类型的燃气提供有多种气炬枪。（详情参见章节 12，工作数据。）

可用的燃气	标识
乙炔	A
丙烷	P



仅允许使用气炬枪标记的燃料气体。
仅可将气炬用于专门为相应气炬枪设计的加工方法。

4 连接和连接件

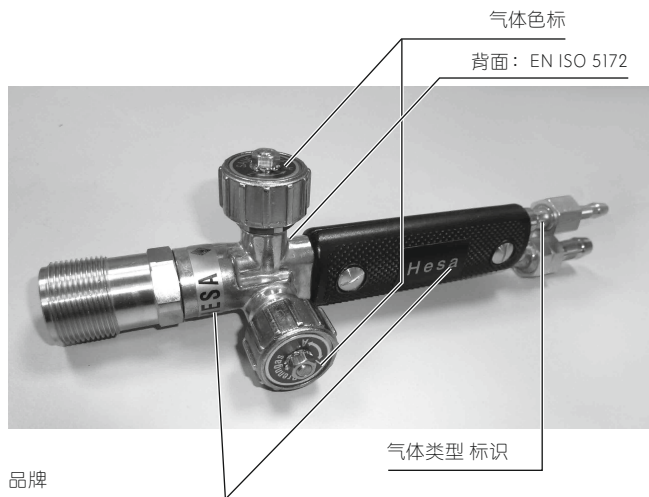
调试前，须将气炬连接到合适的氧气和气体供应源。为此须遵照 EN 560 的要求。每次使用前都应检查所有连接件的气密性。确保气密性后，才可实际点火使用气炬。

5 标识

5.1 标记释义

i 具有射吸效应的喷射混合器		
气体类型	标记	色标
氧气	O	蓝色 绿色 (美国)
乙炔	A	红色
丙烷	P	红色

5.2 HESA SL/56 型手柄

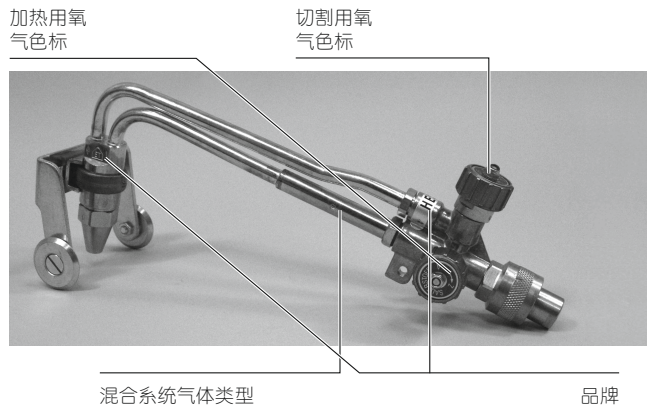


5.3 预热 / 加热和矫直加热气炬枪



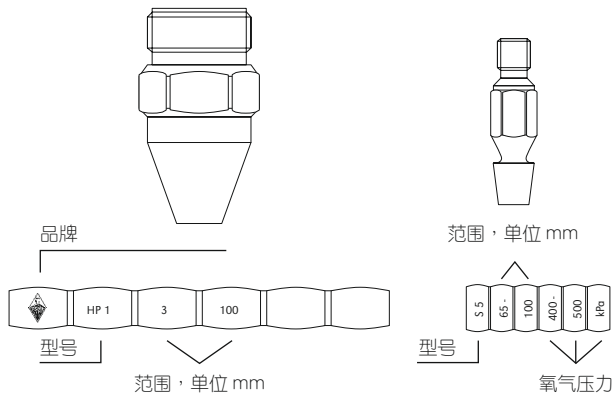
5.4 割炬

此处所画割炬仅作参考。



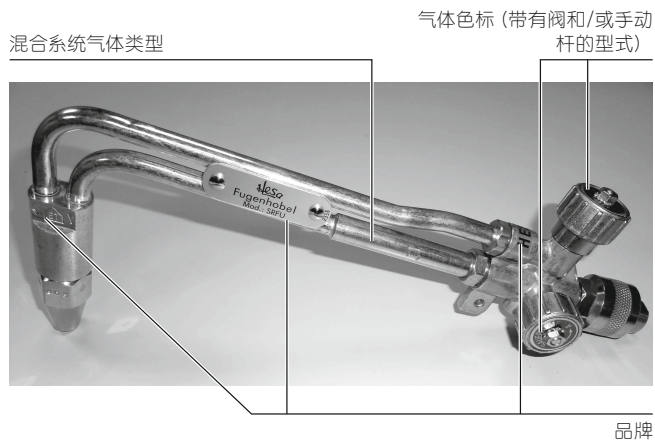
5.5 标识符合 EN ISO 5172

示例：射吸式气炬的割嘴和加热喷嘴

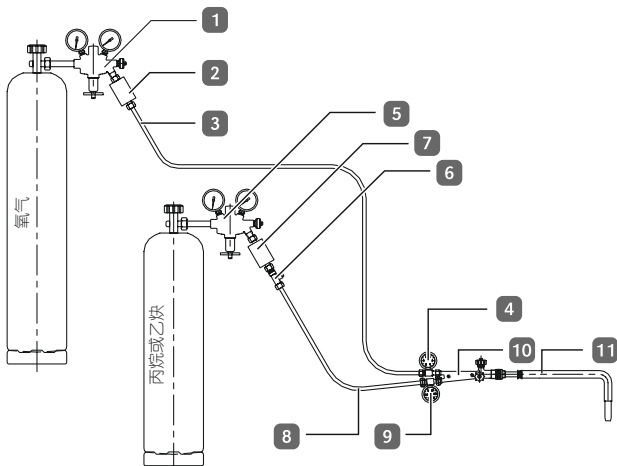


5.6 气刨

此处所画气刨枪仅作示例。



6 气焊设备结构示意图



- 1 HESA 70 型氧气减压表
- 2 氧气防回火阀 (遵守国家规定)
- 3 氧气软管
- 4 氧气校对小表 (选配)
- 5 HESA 70 型燃气减压表 (丙烷或乙炔, 使用乙炔时需用栅栏连接取代图中所画)
- 6 软管破裂保护装置或双层漏气保护系统 (仅限丙炔)
- 7 燃气防回火阀 (丙烷或乙炔)
- 8 燃气软管 (适用于丙烷或乙炔)
- 9 燃气校对小表 (选配)
- 10 HESA SL/56 型手柄或 SMARTWELD RECORD
- 11 气炬枪

7 调试

7.1 准备工作

- 1) 检查是否所有螺纹接口和密封件均洁净且未受损。

! 确保所有会与氧气接触的部件均未沾油脂！**爆炸危险！**

- 2) 按照 EN ISO 3821 的规定，将软管 (3 和 8) 连接到气炬输入端 (10) 或减压表输出端 (1 或 5) 或防回火阀入气口 (2 或 7)。只能使用符合 EN 560 规定的软管和接管螺母。

i 连接螺纹规格视国家而定。

使用软管连接器时，连接器必须符合 EN 561 的规定！

- 3) 按照 EN 730-1 和 EN 730-2 的规定，抽取燃气时应使用安全装置。建议也使用安全装置保护氧气入气口。
- 4) 在为 HESA SL/56 型手柄或 SMARTWELD RECORD (10) 选用合适的气炬枪 (11) 时，应按照 THERMIT® 焊接方法、根据需要执行的作业如加热、矫直、火焰切割或预热进行选择。

在将气炬枪安装到手柄上时，确保部件和密封件洁净、完好。气炬枪 (11) 的连接螺母应手动拧紧。必要时可以使用扳手。

7.2 加热/预热、矫直

7.2.1 调整工作压力

首先，应让 HESA SL/56 型手柄或 SMARTWELD RECORD (10) 上的氧气和燃气阀处于关闭状态。缓慢开启气瓶阀，此时减压器 (1 和 5) 上的调整螺丝必须处于放松状态。然后，必须在减压器 (1 和 5) 上通过旋入对应的调整螺丝，将工作压力调整至作业指导或气炬枪规定的工作压力。在火焰燃烧时还可对工作压力进行补充调节。

7.2.2 点火并调整气炬的火焰

首先在 HESA SL/56 型手柄或 SMARTWELD RECORD (10) 上完全打开氧气的调整阀，然后在 HESA SL/56 型手柄或 SMARTWELD RECORD (10) 上部分打开燃气的调整阀。**立即**点燃喷出的混合气体。此后如有必要，在减压器的调整螺丝上调节工作压力。仅通过调整燃气阀获得焊接工作所需的中性火焰。首先调整至燃气过量。然后调小燃气供应量，直至出现最长的、轮廓分明的中性焰。

7.3 火焰切割/气刨

7.3.1 准备工作

应根据所需执行的作业选用相应的割嘴，然后将其气密地拧入割炬(11)的气炬头，只使用洁净、完好的 HESA 喷嘴！确保喷嘴和气炬头的密封面无瑕疵。必要时将导向小车固定在气炬头上，调整喷嘴到工件表面的距离。

7.3.2 调整工作压力

首先，应手柄(10)或割炬(11)上的氧气和燃气阀处于关闭状态。缓慢开启气瓶阀，此时减压器(1和5)上的调整螺丝必须处于放松状态。然后，必须在减压器(1和5)上通过旋入对应的调整螺丝，将工作压力调整至所需的或气炬枪规定的工作压力。在火焰燃烧时还可对工作压力进行补充调节。

7.3.3 点火并调整火焰

首先完全打开手柄(10)上的氧气调整阀，然后完全打开割炬(11)上的加热用氧气阀，最后部分打开手柄(10)上的燃气调整阀。必须**立即**点燃喷出的混合气体！应通过调整加热用氧气阀(11)或燃气的调整阀(10)调整中性火焰(同铝热焊工艺火焰)。现在完全打开切割用氧气阀，必要时重新调节氧气压力。将火焰重新调整至中性焰。然后重新关闭切割用氧气阀。

7.3.4 火焰切割特性

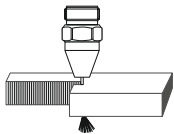
将割炬移动至切入位置，使用加热火焰将工件局部加热至熔融温度，大致为浅红色。



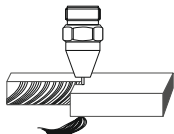
不要熔化材料以致其燃烧或排出！

然后在切入处打开切割用氧气阀，并沿切割方向移动割炬。如有排渣、垂直的火花、切割噪音和棱角分明的切割边缘即可判断切割速度正确。

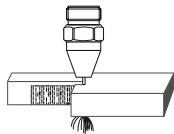
正确



太快



太慢



7.3.5 气刨特性

进行加热时，刨嘴与工件表面呈 60° 至 70° 夹角。起始点使用加热火焰加热至熔融温度。一旦表面开始熔化，即将刨嘴倾斜至与工件表面呈 15° 至 30° 夹角，同时缓慢打开气刨用氧气阀，让气刨用氧气射流沿作业方向到达加热表面。同时还必须开始进给，将形成的熔渣流均匀地驱赶在气刨嘴前方，在此过程中将气刨嘴的边缘放在需要气刨的工件或已经气刨的焊缝工件上。通过改变气刨嘴与工件的相对位置、加快或减缓进给速度来达到所需的坡口宽度和坡口深度。如果产生了缺陷，需要再次气刨至更大深度。

8 工作结束

关停气炬的步骤与点火时相反：首先关闭 HESA SL/56 型手柄或 SMARTWELD RECORD (10) 上的燃气调整阀，然后关闭氧气调整阀。

如果是气割和气刨，首先关闭切割用氧气阀 (11)，然后关闭燃气调整阀，最后关闭手柄 (10) 或割炬 (11) 上的氧气调整阀。

如需长时间停止作业，还需关闭所有气瓶阀或入气口阀。在这种情况下，应通过打开 HESA SL/56 型手柄或 SMARTWELD RECORD (10) 上的调整阀以及切割用氧气阀，为所有减压表和软管卸除负载。此后，通过旋出调整螺丝放松减压表。

9 操作和维护

9.1 维护

9.1.1 清洁气炬和喷嘴

为了确保功能正常和安全，应小心使用本设备，避免其受到机械损伤以及污染。应让割嘴和其他喷嘴保持洁净，必要时可使用合适的喷嘴清洁剂以及使用铜丝刷予以清洁。



不得扩大喷嘴孔！

9.2 故障

9.2.1 气炬损伤

如果螺纹连接和喷嘴不密封或因气炬回烧出现损伤、混合部位熔化、喷射器堵塞，应停用或不使用气炬。仅可由获得授权的修理厂进行修理。

9.2.2 气炬逆火

这表示气流喷出速度降低，例如因为喷嘴浸入焊接熔池或气割熔池而受到污染或因操作失误。火焰浸入气炬内部，然后熄灭并伴随有爆裂声。重新点燃气炬！

9.2.3 回火

回火时，火焰深入气炬内部并在混合腔区域继续燃烧。同时会产生爆裂声和啸叫声。在这种情况下，**应立即同时快速地**关闭 HESA SL/56 型手柄或 SMART-WELD RECORD (10) 上的氧气和燃气调整阀。发生回火后，应在通有氧气（打开氧气阀）的情况下，将发烫的气炬置入水中冷却。

9.2.4 爆燃

气炬的火焰返回到气炬的前部装置和软管。

9.2.5 气体倒回

高压气体倒回到低压气体的软管中。这可能导致爆燃。

9.3 射吸检查

每次调试时都应进行射吸检查。

关闭燃气减压表 (5) 上的输出阀。然后拧下 HESA SL/56 型手柄或 SMART-WELD RECORD (10) 上的燃气软管 (8)。打开氧气和燃气的调整阀。此时，氧气从气炬嘴喷出。将指尖按在 HESA SL/56 型手柄或 SMARTWELD RECORD 用于燃气的管接头上。如有射吸效应，指尖应明显感觉到吸力。如果没有射吸效应，则不得使用该气炬枪，必须请获得授权的厂家检查 / 维修。

10 服务和修理

10.1 修理厂

仅允许由获得授权的修理厂中的专业人员进行修理。

10.2 备件

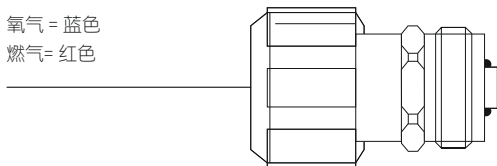
只有原装备件才能保证功能正常和安全。禁止将 HESA 产品与竞争对手产品混用。如有需要，可索取备件清单。

10.3 一体式阀

内置的一体式阀均具有相同结构，且免维护。如果阀损坏或不密封，必须予以更换。更换时应将阀置于打开状态并旋下。清洁密封面后，将套有 O 形环的新一体式阀旋上并拧紧（力矩约 40N·M）。

i 重要：在手轮凹槽内放置正确的标牌以便识别气体！

氧气 = 蓝色
燃气 = 红色



10.4 检查

修理后，必须对气炬进行全面检查（参见 EN ISO 5172）。

11 废弃处理/回收利用

本章节中包含了正确废弃处理本气炬所有部件所需的全部信息。



应确保环保地废弃处理气炬及其部件。

气炬使用寿命结束后，用户必须负责按照有效规定对各个部件进行废弃处理。

12 工作数据

12.1 ET 气炬的氧气和丙烷消耗量

气炬型号	流速						压力			备注	
	氧气 = O		丙烷 = P		单位 bar		单位 kPa				
	l/h	l/min	l/h	l/min	O	P	O	P			
55-502	13,200	220	4,000	67	7.84	0.131	5.0	1.5	500	150	
55-502	9,900	166	3,000	50	5.88	0.098	4.0	1.5	400	150	
55-502	9,000	160	2,777	46	5.35	0.089	3.5	1.5	350	150	
55-502	8,400	140	2,545	42	4.99	0.083	3.0	1.5	300	150	
55-502	6,300	105	1,909	32	3.74	0.063	2.5	1.5	250	150	
65-504	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100	
65-508	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100	
85-160	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100	
85-507	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100	
85-660	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100	
85-665	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100	
95-502	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100	
95-506	7,000	117	2,333	39	4.572	0.076	4.5	1.0	450	100	

气炬型号	流速						压力			备注	
	氧气 = O		丙炔 = P		单位 bar		单位 kPa		P		
	l/h	l/min	l/h	l/min	kg/min	O	O				
551-503	7,800	130	2,295	39	4.5	0.075	4.5	1.0	450	100	
551-525	7,800	130	2,295	39	4.5	0.075	4.5	1.0	450	100	
551-526	11,700	195	3,315	56	6.5	0.109	2.5	1.5	250	150	
551-526	19,900	332	5,610	94	11.0	0.184	5.0	1.5	500	150	
551-537	18,000	300	6,000	100	11.76	0.196	5.0	1.5	500	150	
560-044	-	-	1,160	19	2.25	0.038	-	1.5	-	150	仅丙炔
560-051	-	-	2,000	34	4.0	0.067	-	1.5	-	150	仅丙炔
580-709	14,000	233	4,667	78	9.147	0.152	5.0	1.5	500	150	
30-560	2,880	48	960	16	1.882	0.031	5.0	1.5	500	150	切割用氧 气：8,000 l/h
30-560	1,920	32	640	10.7	1.245	0.021	4.5	1.0	450	100	切割用氧 气：6,880 l/h
551-541	3,520	59	1,020	17	2.0	0.033	5.0	1.5	500	150	
551-517	7,700	129	2,346	39.1	4.6	0.077	5.0	1.5	500	150	
30-565	2,809	46.8	557	9.29	1.092	0.018	6.0	1.5	600	150	
30-565	1,709	28.5	383	6.38	0.75	0.013	3.0	1.5	300	150	

12.2 ET 气炬的氧气和乙炔消耗量

气炬型号	流速				压力				备注	
	氧气 = O		乙炔 = A		单位 bar		单位 kPa			P
	l/h	l/min	l/h	l/min	O	A	O	A		
30-529	2,820	47	2,820	47	2.5	1.0	250	100		
30-550	3,800	63.33	3,800	63.33	4.5	1.0	450	100		
95-505	2,520	42	2,520	42	4.5	1.0	450	100		
30-561	加热火焰				4.5		450		切割用氧 气：6,400 l/h	
	640	10.67	640	10.67						
551-513	3,400	57	2,750	46	4.5	1.0	450	100		



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