

HIGH PERFORMANCE METAL CUTTING GAS

FROM

HINDUSTAN PETROLEUM CORPORATION LIMITED

ABOUT HP GAS RAZOR

HP GAS RAZOR is the new age high performance Metal Cutting Gas that is transforming the metal cutting industry. The additive fortified LPG can replace the traditionally used Dissolved Acetylene (DA) for metal cutting and give better results.

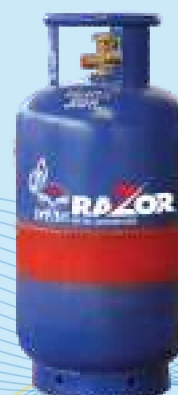
Benefits of HP GAS RAZOR:

- Faster pre-heating and piercing rates as compared to DA
- High flame temperature of 3000 °C
- Faster cutting travel speed as compared to DA
- Faster heat transfer along with reduced slag formation as compared to DA
- Relatively less surface roughness implying smoother, cleaner and sharper cut as compared to DA. It gives clean and narrow kerfs.
- Cheaper by about 27% than traditionally used acetylene (DA)
- Enhanced safety due to its narrower flammability limit as compared to DA and negligible risk of back-fire in the torch
- No sooty flame and lower carbon formation. Hence low maintenance and long life of nozzles.
- Consumption can be easily measured by weighing the cylinder
- Faster, easier cutting on rusty, greasy surfaces (as in scrap) as there is minimal chances of “popping” and backfire
- Narrower Heat Affected Zone (HAZ) as compared to DA



ACETYLENE vs LPG vs HP GAS RAZOR

Characteristic	Acetylene	LPG	HP GAS RAZOR
Chemical Formula	C_2H_2	$C_3H_8 + C_4H_{10}$	$C_3H_8 + C_4H_{10}$ + additive
Flammability range	2.3% - 88%	1.9% - 9.5%	1.9% - 9.5%
Neutral Flame Temp (°C)	3150	2600	3000
Primary flame heat emission (kcal/m ³)	4515	2271	4168
Secondary flame heat emission (kcal/m ³)	8575	19974	19092
Total Heat Emission (kcal/m ³)	13090	22245	23260
Total Heat value (kcal/kg)	11900	12030	12030
Specific Gravity of gas	0.91	1.52	1.52
Boiling Range (°C)	-84	-1 to -40	-1 to -40
Maximum Vapour pressure	44.2 atm @ 20 °C	150 PSI @ 40 °C	150 PSI @ 40 °C
Backfire tendency	Very High	Low	Low
Shock sensitivity	Unstable	Stable	Stable
Availability & Cost	Scarce	Surplus availability	Surplus availability
Cost	Expensive	Cheaper by about 25%	Cheaper by about 27%



Certificate from SGS

SGS



Certificate No.: TC 6842

SGS Oil, Gas and Chemicals
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Date: 12/6/2018
HINDUSTAN PETROLEUM CORPORATION LIMITED
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Certificate of Analysis TO18-004076.001

PRODUCT DESCRIPTION:	HP GAS RAZOR	CLIENT ID:	HP GAS RAZOR
SAMPLE SOURCE:	As Supplied	SGS ORDER N°:	3012066
SOURCE ID:	NA	SAMPLE RECEIVED:	22/05/2018
LOCATION:	MAHUL	SAMPLE ANALYSED:	06/06/2018
SAMPLE TYPE:	As submitted	SAMPLE BY:	Client
		DATE SAMPLED:	Not available
SAMPLE CONTAINER	CYLINDER		
SAMPLE QUANTITY	19 KG		

METHOD	PROPERTY	RESULT	UNITS
* IP 432	Gauge Vapour Pressure at 40°C	864	kPa
ASTM D2163:2014	Hydrocarbons in LPG and Propane/Propene Mixtures by GC		
	Ethane	1.01	% (v/v)
	Propane	24.05	% (v/v)
	Propylene (Propene)	20.77	% (v/v)
	Isobutane (2-Methylpropane)	15.50	% (v/v)
	n-Butane	8.46	% (v/v)
	Trans-but-2-ene	7.91	% (v/v)
	1-butene	6.66	% (v/v)
	Isobutylene (2-methylpropene / isobutene)	10.02	% (v/v)
	n-pentane	<0.01	% (v/v)
	Cis-but-2-ene	4.52	% (v/v)
	Isopentane (2-methyl butane)	0.78	% (v/v)
	1,3-Butadiene	0.32	% (v/v)
* ASTM D6228-2010	Total Sulfur	15	ppm (v/v)
ASTM D1838-2016	Copper Strip Corrosion (1hr at 37.8°C)	1	Rating
* OOG_AP_FRE_ENT_WATE	Free Entrained Water by visual	Not detected	
R			
* ASTM D2420-2013	Hydrogen Sulfide by Lead Acetate paper	Negative	
* ASTM D2158-2016A	Residue on Evaporation	<0.05	mL

****End of Analytical Results****

REPORT COMMENT:

- 1) The above sample satisfy the requirement of IS4576 (Butane Mixture).
- 2) This report supersede of earlier report no. 1621 TOR0000106505.

This laboratory is accredited under ISO/IEC 17025. The results reported herein have been performed in accordance with the laboratory's term of accreditation except calibrations/tests marked with an asterisk (*) in this report which are not within the scope of accreditation for our laboratory.

Result is outside of test method Limits and/or analytical range used in method precision study

This report relates specifically to the sample tested as received. All tests have been performed using the latest revision of the methods indicated, unless specifically marked otherwise on the report. The latest available issue of the test methods in our possession has been used. Precision parameters apply in the determination of the above results. Users of the data shown on this report should refer to the latest published revisions of ASTM D-3244; IP 367; ISO 4259 and Appendix E of IP Standard Methods for Analysis and Testing when utilising the test data to determine conformance with any specification or process requirement. This report shall not be reproduced except in full, without the written approval of the laboratory.

Authorised Signatory

Authorised Signatory



Harish Patil-Laboratory Manager

VIJAY SANKPAL-Super User
12062018 1722 TOR0000106776

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SGS India Pvt. Ltd.

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Member of the SGS Group (Société Générale de Surveillance)

Certificate from BHEL - Welding Research Institute



Bharat Heavy Electricals Limited
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WELDING RESEARCH INSTITUTE, Tiruchirappalli - 620 014
 Website: www.bhel.com



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Fig. 15. Smooth Cut Surface Profile 300 mm (Close up View) using RAZOR

7.0 SUMMARY:

The performance of "Razor" Cutting gas of HPCL was evaluated for a carbon steel plate of thicknesses 50 mm, 100 mm, 200 mm with the following conclusions:

- The cutting speed, dross formation and surface finish are better while using Razor cutting gas as against Acetylene.
- Razor formulation in specific had no key hole formation at recommended speeds of cutting parameters.
- There is no backlign tendency observed for the RAZOR gas during the experimental trials indicating stability of gas flame during cutting.
- The optimum cutting speed using RAZOR for different thicknesses are:

Thickness of Cut (mm)	Recommended Speed for using Razor
50	220 – 320 mm/min
100	180 – 250 mm/min
200	90 – 150 mm/min





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300	70-80 mm/min
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- The macro examination results of the HAZ of RAZOR cut profiles shows a narrow region in the range of 0.965 – 1.125 mm across different thicknesses. This compares favorably across a typical HAZ of less than 2 mm HAZ when cut with other fuels.
- The Razor formulation was also provided to shop floor for field evaluation. The feedback from practical usage for the RAZOR formulation was **GOOD**.
- *Razor consistently outperforms LPG and acetylene for cutting thickness of 50, 100 and 200 mm plates. Hence, it is possible for Razor to be seen as a fuel efficient alternative for cutting metal plate of thickness of 50, 100 and 200 mm.*
- Conclusions of this summary cannot be extrapolated for different thicknesses of same material because the usage of Acetylene for different thickness is not linearly related.

Signature



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Annexure III: Performance Certificate



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Garvish Kumar K
Senior Development Engineer

PERFORMANCE CERTIFICATE

Ref: HPCL Purchase Order No. 1N000199-0N-00155/PKK dt. 21.03.2017

The following points are stated on the performance of HPCL Razor formulations tested at WRI against the referenced work order:

(i) Of the two formulations supplied for evaluation to WRI namely Razor and HPCL LPG, the formulation identified as Razor was superior in all aspects of cutting parameters conducted for thickness up to 200mm of carbon steel material.

(ii) The formulation Razor was also provided to shop floor for evaluation. The feedback received from the shop floor on the performance of the razor formulation was GOOD.

(iii) The formulation Razor was also evaluated using HPCL supplied high speed cutting Torch and the performance was observed to be superior to conventional torch performance.

This information is provided on the basis of observed results on test conditions at WRI and procedures adopted as detailed in the report submitted against the referenced work order.



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Certificate from Lloyds Inspection Agency

LloydsTM
Inspection Agency

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Report Ref: LHMPLY/IN-034/IN-HPC/INSP-15-12-2018

Date: 24 January 2019

INSPECTION & CONSULTANCY REPORT

From

Lloyds Inspection Agency Pvt. Ltd.

SUBMITTED TO

M/s. HINDUSTAN PETROLEUM CORPORATION LTD

FOR

METAL CUTTING GAS TRIALS

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DLA & GAS SYSTEMS

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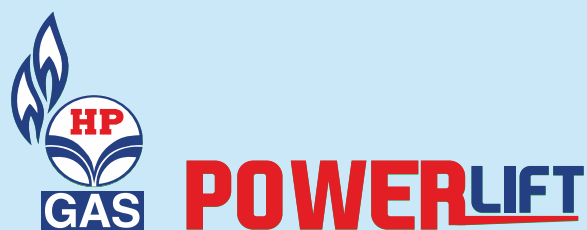
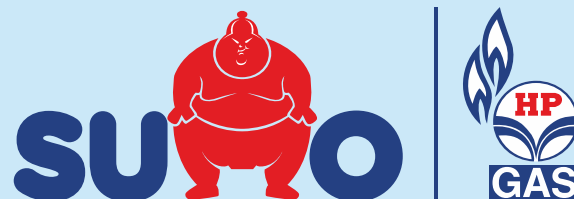
OFFSHORE SUPPLYING

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HP GAS RAZOR used for cutting a 200mm steel plate



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