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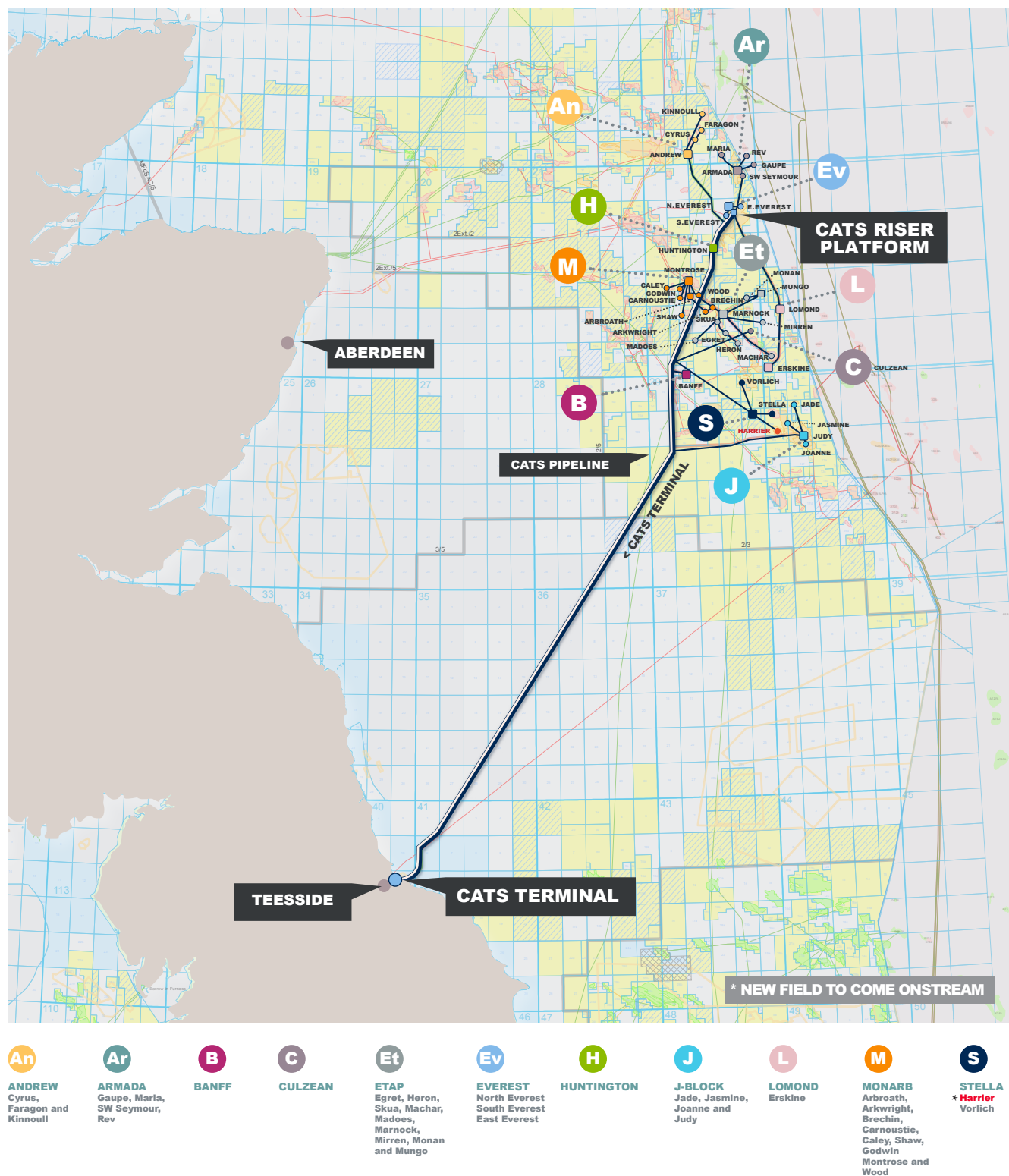
MIDSTREAM



Typical Gas Entry &
Product Specifications

Typical Gas Entry & Product Specifications

This document provides details of the typical gas entry specification and the product specifications which appear in the CATS Transportation Agreement. These specifications may vary at the discretion of the CATS Operator.



Standard Entry Specification

In order to comply with the Entry Specification, all Shipper Gas shall comply at the Delivery Point, with the following requirements:



1. Be delivered at the Delivery Point in gaseous single phase only and commercially free from objectionable odours and from materials and dusts or other solid or fluid matter which might cause injury to or interference with the proper operation of the CATS System and/or which could affect the merchantability of CATS Gas or CATS Product. For the avoidance of doubt, such materials shall include but not be limited to, lead, radioactive materials, waxes, gums, and gum forming constituents, foaming agents and excessive solids;
2. Have a hydrocarbon dew point which at all pressures in excess of 10,340 kPa Gauge does not exceed -2 degC;
3. Have a maximum water content to be the lesser of:
 - a. 15 Kg per million standard cubic metres; or
 - b. that content equivalent to a water dew point at 7,500 kPa Gauge of -26 degC;
4. Have a maximum hydrogen sulphide content of 3.0 ppmv;
5. Have a maximum methyl + ethyl mercaptan sulphur content of 0.5 ppmv; and have a maximum total mercaptan sulphur content of 3.1 ppmv;
6. Have a maximum carbonyl sulphide content of 1.0 ppmv;
7. Have a maximum total sulphur content of 14.4 ppmv measured as hydrogen sulphide;
8. Have a maximum carbon dioxide content of 2.9 mol %;
9. Have a maximum oxygen content of 9.0 ppmv;
10. Have a maximum nitrogen content of 4.5 mol %;
11. Have a total non-hydrocarbon content of 5.5 mol %;
12. Have a maximum mercury content of 0.01 microgrammes per Cubic Metre;
13. Have such delivery pressure at the Delivery Point as may be requested by the CATS Parties from time to time provided that such pressure shall not exceed seventeen thousand two hundred and thirty (17,230) kPa Gauge;
14. Have a maximum entry temperature of 51 degC.

Gas Redelivery Specification

In order to comply with the Gas Redelivery Specification contained within the National Grid Network Entry Agreement, all Shipper Gas shall comply at the Gas Redelivery Point with the following requirements:



1. Commercially free from objectionable odours and from materials or other solid, liquid or gaseous matter, which might interfere with the integrity or operation of the National Grid transportation and distribution network;
2. Hydrocarbon dew point, which at all pressures up to and including 7,000 kPa Gauge does not exceed -2 degC;
3. Water dew point not greater than -10 degC at a pressure of 7,000 kPa Gauge;
4. Maximum hydrogen sulphide content to be 3.3 ppmv;
5. Maximum total sulphur content to be 15 ppmv measured as hydrogen sulphide equivalent;
6. Maximum carbon dioxide content to be 2.9 mol %;
7. Maximum hydrogen content to be 0.1 mol %;
8. Maximum nitrogen content to be 5.0 mol %;
9. Maximum oxygen content to be 10.0 ppmv;
10. Wobbe Index which is not more than 51.41 Megajoules per Standard Cubic Metre and not less than 48.14 Megajoules per Standard Cubic Metre;
11. Gross Calorific Value, which is not more than 42.3 Megajoules per Standard Cubic Metre and not less than 36.9 Mega joules per Standard Cubic Metre (real gross dry);
12. Maximum delivery pressure to be 7,000 kPa Gauge;
13. Temperature not less than 1 degC and not more than 38 degC;
14. Incomplete Combustion Factor (ICF) not more than 0.48;
15. Soot Index (SI) not more than 0.60.

Incomplete Combustion Factor (ICF) and Soot Index (SI) have meanings as defined in Part 1 of Schedule 3 of the Gas Safety (Management) Regulations 1996.

Product Redelivery Specification

Propane and Butane Specifications

The Propane and Butane export specifications are set out hereunder.

The CATS Parties retain the right at their discretion to vary the specifications from time to time provided that at all times the delivered Product will be of merchantable quality. In all cases the test methods shall be based on the most recently published standards:

SPECIFICATION	PROPANE	BUTANE
Moisture Content	Pass	
Free Water Content		None
DEWPOINT	Less than -40 degC at 1.013 bara	Less than -30 degC at 1.013 bara
VAPOUR PRESSURE @ 37.8 degC	1434 kPa Gauge (maximum)	483 kPa Gauge (maximum)
COMPOSITION	(LIQUID VOLUME)	(LIQUID VOLUME)
Nitrogen	0.1% (maximum)	0.1% (maximum)
Carbon Dioxide	0.1% (maximum)	0.1% (maximum)
Ethane (C2 hydrocarbons)	2.0% (maximum)	0.1% (maximum)
Propane	95.0% (minimum)	0.5% (maximum)
Mixed Butanes	2.5% (maximum)	95.0% (minimum)
Pentanes	0.1% (maximum)	1.5% (maximum)
Total unsaturated		
hydrocarbons (olefins)	1.0% (maximum)	1.0% (maximum)
RESIDUAL MATTER:		
Maximum R Number	10	10
Maximum O Number	Pass	Pass
CORROSION, COPPER STRIP		
Maximum	No.1	No.1
H₂S	1 ppm (vol.) (maximum)	1 ppm (vol.) (maximum)
TOTAL SULPHUR (Maximum)	50 ppm (wt)	50 ppm (wt)
MERCURY	10 ppb (wt) (maximum)	10 ppb (wt) (maximum)
DELIVERY PRESSURE	a maximum of 19 barg	a maximum of 10.5 barg
DELIVERY TEMPERATURE	33 degC (maximum)	33 degC (maximum)

Condensate Characteristics

Condensate shall be of average quality and merchantable, and comply with the specification set out hereunder.

The CATS Parties retain the right at their discretion to vary the specifications from time to time provided that at all times the delivered Product will be of merchantable quality. In all cases the test methods shall be based on the most recently published standards:

SPECIFICATION	TEST METHOD	VALUE
WATER		
Free Water Content		None
REID VAPOUR PRESSURE @37.8 degC	ASTM D- 323	12.54 psia (maximum)
DELIVERY PRESSURE		a maximum of 4.0 barg
DELIVERY TEMPERATURE		33 degC (maximum)
MERCURY		5 ppb (weight)



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