

SeisDAS – Data format specifications

The dataset produced within the SeisDAS project includes as many files as recorded shots, organized in subfolders, one for each shot point, for a total of 3 shot points (EP).

Each record file is written in SEG-Y format¹; it includes a reel header which precedes the data part of the file.

The reel header is a fundamental component for describing seismic data in the SEG-Y format. It consists of **3600 bytes**, divided into two main parts:

Textual File Header (3200 bytes)

- It is encoded in **EBCDIC**, formatted in 40 rows, each one including 80 characters.
- Contains descriptive information as shown below (e.g.):

```
C01 - - - - - DATA PROPERTIES - - - - -
C02 PROJECT NAME: Transnational Access - April 2025
C03 GEOPHYSICAL COMPANY: OGS
C04 OBSERVER: FABIO MENEHINI
C05 USER GROUP LEADER: Silixa Ltd.
C06 FACILITY/SITE LOCATION: PiTOP - OGS test site
C07 - - - - - RECORD PROPERTIES - - - - -
C08 ACQUISITION TYPE: VSP
C09 Datum elevation [m]: 256
C10 Source depth [m]: 0
C11 Main receiver depth [m]: 349.0
C12 RECEIVER WELL: PITOP-2
C13 WATER LEVEL AT RECEIVER WELL [m]: 8.5
C14
C15 CLAMP INDEX: 1
C16 SOURCE LOCATION ID: 4000
C17 - - - - - SOURCE PARAMETERS - - - - -
C18 DESCRIPTION: OGS MINIVIB - P wave mode
C19 SWEEP FREQUENCIES [Hz]: 10 - 300
C20 SWEEP LENGTH [s]: 16
C21 START-END TAPER (cosine) [s]: 0.8, 0.8
C22 LOAD PEAK FORCE [lbf]: 2000
C23
C24
C25
C26
C27
C28
C29
C30
C31
C32
C33
C34
```

¹ For a complete and official description, you can consult the SEG-Y Rev 2.0 specification published by the Society of Exploration Geophysicists:
https://library.seg.org/pb-assets/technical-standards/seg_y_rev2_0-mar2017-1686080998003.pdf

C35
C36
C37
C38
C39
C40

Binary File Header (400 bytes)

- Starts at byte **3201** and ends at byte **3600**
- Encoded in binary format and includes:
 - **Number of traces per record** (3213–3214)
 - **Sampling interval (µs)** (3217–3218)
 - **Number of samples per trace** (3221–3222)
 - **Data format code** (3225–3226): 5 = IEEE floating point notation

Trace Header (240 bytes)

The **trace header** in the **SEG-Y (SEG-Y)** format is a crucial part of the file that contains seismic data. Each *trace* (i.e., a recording of a seismic signal) is preceded by a header that describes the characteristics of that trace. This header follows a standard structure and includes information useful for processing and interpreting the data.

In the standard SEG-Y format (version 1, as defined by the SEG Technical Standards Committee), the trace header consists of **240 bytes** and includes fields with information such as:

byte n.	field name	value type	description
1-4	trac1	int32	trace sequence number within line
5-8	tracr	int32	trace sequence number within segy file
9-12	fldr	int32	original field record number
13-16	tracf	int32	trace number within the original field record
17-20	ep	int32	energy source point number
37-40	offset	int32	distance from center of the source point to the center of the receiver group
41-44	gelev	int32	receiver group elevation
45-48	selev	int32	surface elevation at source
49-52	sdepth	int32	source depth below surface
53-56	gdel	int32	Datum elevation at receiver group - ground level
57-60	sdel	int32	Datum elevation at source - ground level
61-64	swdep	int32	water table at source
65-68	gwdep	int32	water table at receiver
69-70	sca1el	int16	scalar to be applied to all elevations and depths
71-72	scalco	int16	scalar to be applied to all coordinates
73-76	sx	int32	source coordinate x
77-80	sy	int32	source coordinate y
81-84	gx	int32	group coordinate x
85-88	gy	int32	group coordinate y

89-90	counit	int16	Coordinate units: 1=meters
109-110	delrt	int16	delay recording time in ms
115-116	ns	uint16	number os samples
117-118	dt	uint16	sampling interval in us
125-126	corr	int16	correlated: 1=no; 2=yes
153-156	msdepth	int32	measured source depth
157-158	year	int16	year data recorded
159-160	day	int16	day of year
161-162	hour	int16	hour of day
163-164	minute	int16	minute of hour
165-166	sec	int16	second of minute
173-174	grnofr	int16	sensor id
205-208	ntr	int32	number of traces
211-212	gl	int16	Gauge length in cm.
213-214	azimuth	int16	azimuth angle between receiver and source in degrees/100
223-224	sfreq	uint16	sampling frequency in Hz
229-232	gdepth	int32	true vertical depth of the receiver
233-236	mgdepth	int32	measured depth of receiver
237-240	cabdist	float32	F.O. trace cable distance from interrogator

All data is written in Big Endian format.