DRAFT

Specification For Metal Framing Components for Drywall systems for Interiors application

Scope:

This Standard is about specifications of GI, AZ & ZAM metal profiles which are used in drywall systems. It specifies the material properties, dimensional tolerances, design requirements, testing parameters and installation methodology for the construction of Drywalls.

Contents:

1. Terminology

For the purposes of this document, the following terms and definitions apply:

1.1. Drywall: The wall made from wall board, framing members, fixing accessories and final finishing material. In Drywalls, no water used during erection.

Commented [TM1]: Instead of Wall Board - Gypsum Plasterboard to be mentioned

1.2. Drywall Frame: The frame on which the drywall board to be fixed. Wall framing includes the vertical and horizontal members of partitions. These members, referred to as studs, tracks, noggings and channels, serve as a screwing base for all covering material and support the floors, ceiling, and roof.

1.3. Drywall Board: Any of various large rigid sheets made of Gypsum plaster, Fiber cement, Calcium Silicate, Magnesium, to be used in drywall construction as a facing material fixed on the metal frame and receive the final finishing material.

1.4. Drywall Accessory: The components used to connect the Drywall framing members, Drywall board fixing onto the frame and fixing of metal frame to the existing building structure.

1.5. Drywall Finishing material: The material used to finally finish the Drywall boards joints, seal the openings, and fill the connection joints with the existing structure of the building.

1.6. Gypsum Plasterboard: Gypsum plaster boards consist of a gypsum plaster core with or without fiber encased in and firmly bonded to strong durable paper liners on both side of the board, to form a board. Core shall be dried across full width. The face and back papers shall be securely bonded to the core. The paper surfaces may vary

Commented [TM2]: Kindly add Glassmat Lining Gypsum Boards

according to the use of the particular type of board, and the core may contain an additive to impart additional properties. The longitudinal edges are paper covered and profiled to suit the application. (Refer to standard IS 2095 Part 01:2023)

1.7. Fiber Cement Board:
Fiber cement flat sheets consist essentially of an inorganic hydraulic binder (Portland Cement) and Fly ash. Process aids, fillers and pigments which are compatible with fiber reinforced cement may be added.

1.8. Calcium Silicate Board: Calcium Silicate Board is consisting of inorganic material Silica, Sand, Portland cement and cellulose fiber.

1.9. Magnesium Board: Magnesium Board is made from magnesium oxide, which is type of mineral cement, and contains magnesium.

1.10. Cement Bonded Wood Particle Board: Cement Bonded Wood particle board is made from wood chips bonded with Portland Cement and additives.

1.11. Stud
A cold-formed steel vertical framing member in a wall assembly.

1.12. Channel (track)
A member designed to receive the ends of metal studs, attached directly to the structural members of the building.

1.13. Coated Thickness
Thickness of steel including surface coating. This is also termed as TCT (Total coated thickness).

1.14. Core Thickness
Thickness of steel excluding surface coating. This is also termed as BMT (base metal thickness).

Commented [TM3]: Uncoated Thickness instead of Core Thickness

1.15. Flange
Part of the section to which gypsum board is usually attached, depending upon the position of the section.

1.16. Web
Central and connecting part of the section between flanges of a stud and channel. section.

1.17. Hot Dip Aluminum Zinc Alloy Coating (AZ)
Application of Zinc aluminum coating by immersing the prepared product in a molten bath which is composed of 55% aluminum, 1.6% silicon, and the balance Zinc.

1.18. Hot Dip Zinc Coating
Application of Zinc coating by immersing the prepared product in a molten bath containing a zinc content of at least 99%.

1.19. Interior No-Load-Bearing Wall Assembly
A field-fabricated wall assembly consisting of cold-formed steel vertical framing members (studs) spaced a maximum of 610 mm on center and gypsum panel products sheathed on one or both sides of the wall assembly.

Commented [TM4]: Non Load Bearing

1.20. Metal Section
Corrosion-protected steel member, cold-rolled to form profiles.

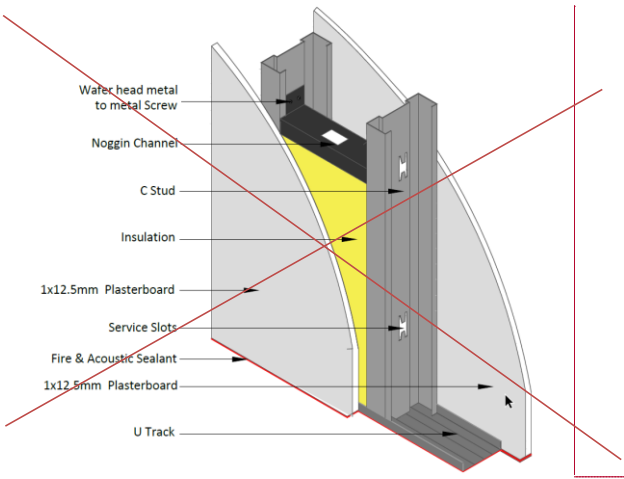
1.21. Nominal Thickness

Thickness of steel stated by the manufacturer of the metal section, including metallic surface coating.

1.22. Nominal Width/Depth
Width and depth of sections stated by the manufacturer.

1.23. Non-Loadbearing Element
Element that does not transfer vertical forces and whose contribution to the stability of the building is not considered.

2. Pictures of Drywall with all components



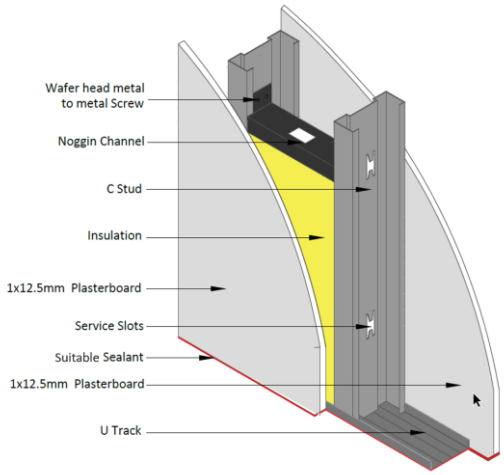


Fig 01: Drywall Metal Component & Accessories

Commented [TM5]: What is the difference between Coated Thickness & Nominal Thickness

Commented [TM6R5]: Similar terms used in COATED THICKNESS 1.13 either one has to be removed

Commented [TM7]: Suitable Sealant Should be mentioned

Commented [TM8R7]: Only Wall board has to be mentioned no need to mentioned thickness & Gypsum Plaster Board

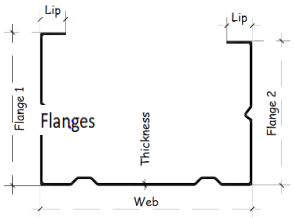
Commented [TM9R7]: Mention only STUD no need to specify

Commented [TM10R7]: Rather than Track mentioned Channel / Track

3. Metal Profiles and Accessories

The below table gives the details of metal profiles and it's components.

Table 01- Drywall Profiles

Profile name	Description	Drawing	General Dimensions	Dimension Tolerance	General Applications
Metal Studs	"C" Stud	 **C Stud**	Length- 2400, 2700 3050, 3660, 4650mm Flanges 1- 34mm; Flange 2- 36mm Web- 48, 70, 92, & 146mm. Lip-6mm; Thickness- 0.5, 0.55, 0.7, 0.9mm	Length- upto 3000mm (-/+) 3mm Length 3000 to 5000mm (-/+)4mm; Length more than 5000mm (-/+) 5mm Flanges (1&2)-(-/+)0.5mm; Web-(-/+)0.5mm; Lip-(-/+)1mm; Thickness-(-)0.05mm	"C" Stud to be used as vertical member of metal frame for all height of **regular Drywall**
	"I" Stud		Length- 2400, 2700 3050, 3660, 4650mm Flanges - 38mm; Web- 48, 70, 92, & 146mm. Thickness- 0.5mm 0.7mm & 0.9mm	Length- upto 3000mm (-/+) 3mm Length 3000 to 5000mm (-/+)4mm; Length more than 5000mm (-/+) 5mm Flanges- (-/+)0.5mm;	"I" Stud to be used as vertical member of Drywall metal frame specially **when thickness is the main criteria of greater height Drywalls**. The selection of "I" stud will be based on the structural calculation by the specifier.

Commented [TM11]: Minimum Dimensions Requirement

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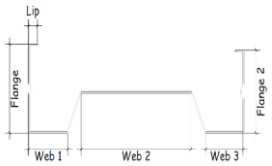
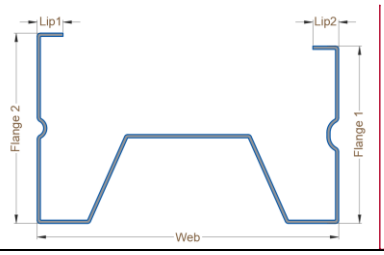
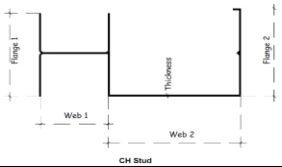
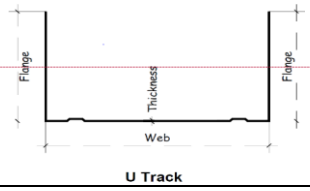
Commented [TM12]: For Tolerance Refer BS EN 14195

Commented [TM13]: For Thickness Tolerance Refer IS 16162

Commented [TM16]: I-Stud Nomenclature missing

Commented [TM15]: Marked Areas to be modified

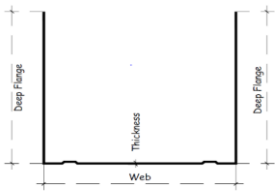
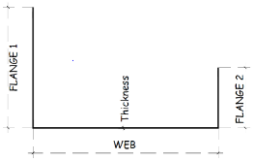
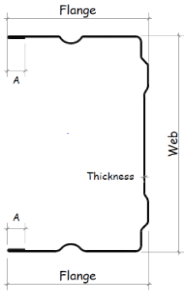
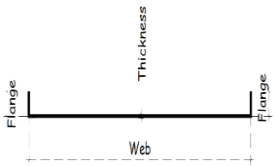
				Web- (-/+)0.5mm; Thickness- (-/+)0.05mm	
	Acoustic stud	 	Length- 2400, 2700 3050, 3660, 4650mm Flanges 1- 44mm; Flange 2- 41mm Web: 70mm. 92mm & 146mm Lip-6mm; Thickness- 0.5mm	Length- upto 3000mm (-/+) 3mm Length 3000 to 5000mm (-/+)4mm; Length more than 5000mm (-/+) 5mm Flanges- (-/+)0.5mm; Web- (-/+)0.5mm; Thickness- (-/+)0.05mm	"∑" Stud to be used as vertical member of Drywall metal frame specially **when acoustic is the main criteria of Drywalls.** The selection of "∑" stud will be based on the acoustic value required by the end user- and specified by the acoustic consultant.
	"CH" Stud (shaft wall stud)		Length- 3000, 3700mm; Flanges- 44mm; Web(1+2)- 48,60,64,102,152mm; Thickness- 0.5 0.7, 0.9mm	Length- (-/+)5mm; Flanges- (-/+)0.5mm; Web- (-/+)0.5mm; Thickness- (-)0.05mm	"CH" Stud to be used as vertical member of metal frame **for Shaft wall** made with Shaft Liner and Core Board.
Floor & Ceiling track	"U" Track		Length- 3660mm; Flanges - 32mm; Web- 50,62,72, 94,148mm; Thickness- 0.5, 0.7, 0.9mm	Length 3000 to 5000mm (-/+)4mm; Flanges (-/+)0.5mm Web:(-/+)0.5mm; Thickness:(-/+)0.05mm	"U" Track is the horizontal member of Drywall metal frame to be used at existing floor and soffit in **all regular Drywalls.**

Commented [TM17]: Change the Acoustud Image stating single WEB Dimensions

Commented [PP[H18]: Commonly available and used at site

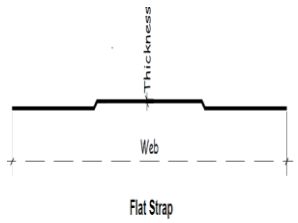
Commented [PP[H20]: Commonly used

Commented [TM19]: Channel / U Track

	Deflection head	 Deep Flange U Track	Length- 3050, 3660mm; Flanges - 50mm/ 70mm; Web- 52,72, 92,148mm; Thickness- 0.5, 0.7, 0.9mm	Length 3000 to 5000mm (-/+)4mm; Flanges- (-/+)0.5mm; Web- (-/+)0.5mm; Thickness- (-/+)0.05mm	"Deflection head" is the horizontal member of Drywall metal frame with bigger flange size to be used at soffit **to accumulate the deflection in true slab due to thermal expansion & loads.**
	"J" Track (shaft wall floor tract)		Length- 3000mm; Flange1 - 50mm; Flange2- 25mm, Web- 64,102,152mm; Thickness- 0.5, 0.7, 0.9mm	Length- (-/+)5mm; Flanges- (-/+)0.5mm; Web- (-/+)0.5mm; Thickness- (-)0.05mm	"J" track is the horizontal member of **Shaft wall metal frame** to be used at existing floor.
Bracings	Nogging Channel		Length- 695, 492mm,390mm; Flanges 1- 34mm; Flange 2- 36mm Web- 48, 70, 92,146mm hemming-4mm; Thickness- 0.5,0.7mm	Length-(-/+)0.5mm; Flanges (-/+)0.5mm; Web-(-/+)0.5mm; Thickness-(-/+)0.05mm	"Nogging Channel" is the horizontal bracing member of Drywall metal frame to be used behind the horizontal joint of Wall board wherever specified by the manufacturer due to specific **Fire & Acoustic performance requirement.**
	Fixing Channel		Length- 2500mm; Flanges - 9mm; Web- 99mm; Thickness- 0.9mm	Length- (-/+)5mm; Flange- (-/+)0.5mm; Web- (-/+)0.5mm; Thickness- (-)0.05mm	"Fixing Channel" is the horizontal bracing member of Drywall metal frame to be used behind the horizontal joint of Wall board wherever specified by the manufacturer **due to planned loads on the wall**

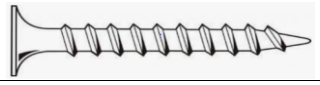
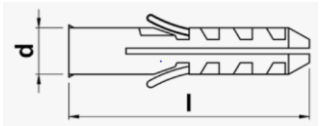
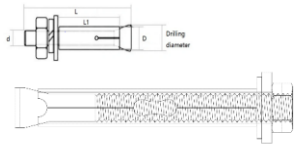
Commented [PP[H21]: Added 70mm channel, and correction 94 instead of 92mm

Commented [PP[H22]: Added 390mm long noggin channel, Flanges are equal 40mm to avoid mismatch of board joint

	Flat Strap		Length- 3000mm; Web- 75mm,90mm; Thickness- 0.5mm 0.55mm	Length- (-/+)5mm; Web-(-/+)0.5mm; Thickness- (-/+)0.05mm	"Flat Strap" is the horizontal bracing member of Drywall metal frame to be used behind the horizontal joint of Wall board **to avoid mutual play in both side boards & with no specific performance requirement**, wherever specified by the manufacturer.

Commented [PP[H23]: Web 75mm available with 0.5mm thickness

Table 02- Drywall Accessories

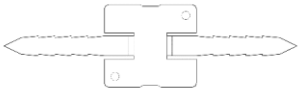
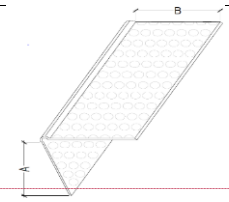
S.no.	Accessory description	Drawing	General Dimensions	Dimension Tolerance	General Applications
1	Drywall Screws		Length- 25, 32, 35, 38, 45,50 55 & 65mm	Minimum penetration of screw should as per design requirement and manufacturer recommendation.	"Drywall Screws" are screws to be used to fix **Wall boards on Metal frame**
2	PVC Fasteners		35,45mm	Minimum penetration of fastener should be as per design requirement and manufacturer recommendation.	"PVC Fasteners" are the fasteners to fix Metal framing member to existing concrete/ masonry structure where no specific performance is required in Drywall
3	Metal to Metal Screws		Length- 13mm, diameter- 4.2mm	Minimum penetration of screw should as per design requirement and manufacturer recommendation.	"Metal to metal screws" are to be used to **connect two Metal framing members** at the junctions.
4	Metal Fasteners		Length- 35,40,50mm; diameter- 8,12.5mm	Minimum penetration of fastener into concrete should be as per design requirement and manufacturer recommendation.	"Metal Fasteners" are the fasteners to fix Metal framing member to existing concrete structure wherever **structural requirement or Fire performance required** in Drywall
5	Insulation holds strap.		Length- 30meter; width- 25mm; Thickness- 0.5mm	Length- (-/+)5mm; Width- (-/+)0.5mm; Thickness- (-)0.05mm	Insulation hold strap is the metal strip to be fixed in wall frame to hold the insulation mat in the cavity of frame **to avoid settling down.**

Commented [TM25]: Drywall Screws are Available in 70mm also

Commented [PP[H24]: 50mm drywall screw is available

Commented [TM26]: Metal Fastener comes in 70mm Length Also

Commented [TM27]: We can Display Glasswool Holding Clip

6	Insulation Holding Clip		Dimensions; 178x50mm		Insulation holding clip to be inner surface of Plaster boards to hold the Insulation intact
7	Metal Beads	 	Length- 3000mm, Flanges- 25,35,50mm; Thickness- 0.5mm	Length- (-/+)5mm; Flanges- (-/+)0.5mm; Thickness- (-)0.05mm	Metal Beads are to be fixed at external and internal corners of Drywall to **protect them against chipping and make them straight** wherever specified by the specifier and agreed with user.

Commented [PP[H29]: Only on external corner of drywall

Commented [TM28]: Change the image of Angle Bead

4. Metal Type, Grade, Coating & Section Properties

4.1. Metal type & grade: Drawing (lock forming) designated as GPL in IS 277

4.2. Metal coating: Zinc (GI), alloy of Zinc & Aluminum (AZ) and Magnesium (ZAM)

Commented [TM30]: Alloy of Zinc Aluminum & Magnesium

Note: The mass of coatings (Galvanizing, AZ, ZAM) of rolled Drywall metal profiles shall be agreed between Manufacturer and & the Purchaser. This shall vary due to different rolling machines & methodology.

Commented [TM31]: after surface hardening it is impossible to check GSM... hence remove the word ROLLED

4.3. Mechanical properties of Profiles

4.3.1. Calculation of section properties

Where users find it necessary and required to predict the performance of the installed Profiles, this can be undertaken by calculation using, as a basis, the mechanical properties of the metal framing Profiles. To ensure that this can be done by manufacturers shall provide the necessary material properties and, where required, the calculation shall be made in accordance with the methods/principles given below.

4.3.2. Principles

a) The thickness used in calculation is the minimum steel core thickness. This is calculated as nominal thickness minus tolerance and thickness of the protective coating.
b) the width of section and flange used in the calculation shall be nominal provided that the tolerances to this standard are met.
c) the metal profile area is not reduced for buckling.
d) the metal profile area is not reduced for cut outs (for services) in the web.
e) the radius of bends is ignored (i.e. calculated as if the bending radius is zero).
f) sub-areas are not repeated.
g) smaller stiffeners etc. are ignored.

4.3.4 Example of calculation- As per Annexture-01

5. Metal Profile Testing

Metal Profiles Properties and test requirements are as per table 03

Table 03- Metal Profile Testing

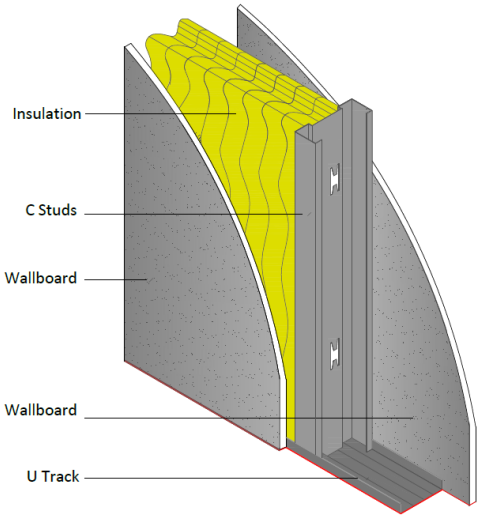
Metal finish	Characteristics	Parameter	Value	Testing method
Normal or minimized spangle	Mechanical properties	Tensile strength	As per IS 277 table 2, clause 6 & 8.1.2	as per IS 1608
		Yield stress		
		Percentage elongation		
	Chemical composition		As per IS 277 table 1, clause 5.1	as per IS 288
	Coating	Mass of Zinc / AZ coating	120 g/m2 Class as per IS 277 table 3, clauses 7.1 & 10.2 for base metal and minimum 100 g/m2 for final finished product.	as per IS 6745
	Grain size & Microstructure		As per IS 4748 & IS 11959	As per IS 4748 & IS 11959

Commented [TM32]: IS 6745 / 15961

6. Installation Methodology

Annexure-3 Installation mythology for a Basic Drywall System

Commented [PP[H33]: Methodology



- Mark the Drywall Location from the layout on the floor & Ceiling.
- The Marking of Ceiling and Soffit Should be in Plumb with the floor layout.

Commented [TM34]: Ceiling & Soffit are same… it should Flooring & Soffit

- The Floor & Ceiling U Channel Shall be screw fixed to the floor & Soffit Slab with Approved Anchor fasteners @ 600mm Centers with the first & last fasteners shall be 50mm from the end of the drywall.

Commented [TM35]: Grouted… Screw Fixed in Wrong Statement

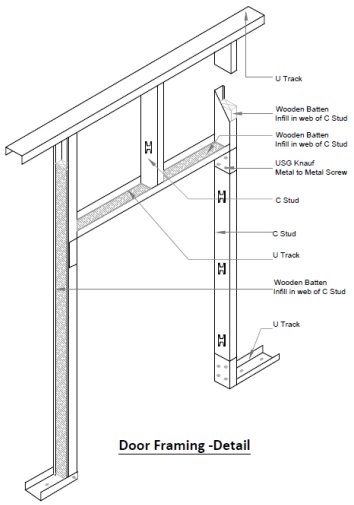
- C Stud are inserted in the floor & Ceiling U Channels with all studs facing in the same directions. The Spacing between the stud shall be 610mm centers or as approved in the system specification. Any overlaps in the metal studs required for extension shall be boxed with minimum 300mm. Ensure that no horizontal joints of the boards coincide with the overlap.
- All C Studs shall be approximately up to 5mm shorter than actual floor to soffit height of the drywall.

Commented [TM36]: 10mm as per Gyproc Methodology

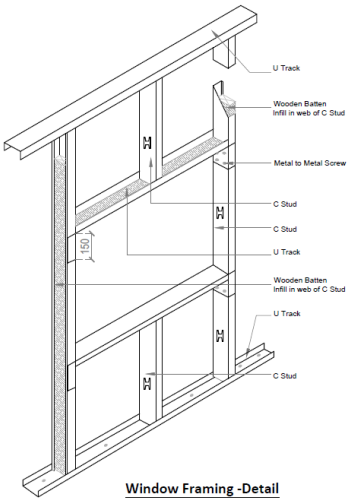
- Opening for doors & windows shall be made with extra piece of floor & ceiling channel in such a way so that floor & ceiling channel overlap the stuck with a minimum of 150mm. All Channels area secured to the stud

with Wafer Head Self tapping screw. The metal stud located at the opening shall be secured to floor & ceiling channel with approved screw.

Commented [TM37]: Suitable



Door Framing -Detail



Window Framing -Detail

- Seasoned wood/Approved stiffeners shall be inserted into metal studs forming the frame of doors/ Chaukhat. These shall be treated with Fire paints of any other coating as approved.
- Extra metal stud area inserted to support the loading as required.
- Fire & Acoustic sealant shall be applied at the perimeter of the drywall with a recommended sealant Gun (Both side)

Commented [TM38]: Sealant has to be generic

- All services like Electric, plumbing to run through the Predetermined slots in the metal studs.
- First layer of the Plasterboard shall be fixed vertically to one side of the metal studs with 25mm drywall screws at 300mm centers. All cut ends & boards at the junctions, walls; perimeter needs to be secured at 150mm canters with 25 mm drywall screws.

Commented [TM39]: Periphery

Commented [TM40]: Centre

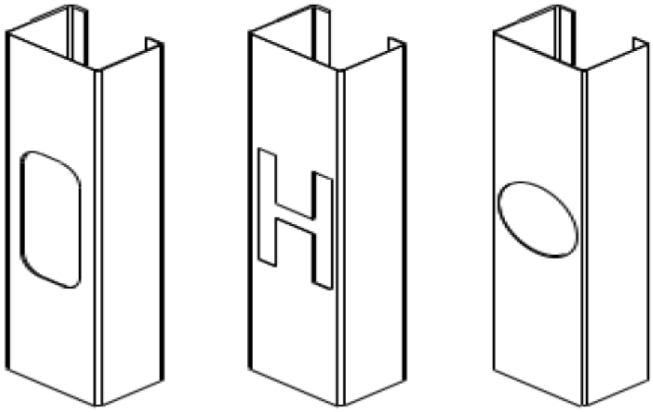
- All Boards shall be secured to metal studs & shall be raised up to 5mm from the finished floor & ceiling level.
- No vertical joints of the plasterboards should coincide vertically with the periphery of doors/windows or any other openings.
- Insulation shall be placed (with the insulation holding strip) inside the cavity after the one side boarding is completed as specified. The first & last holding strip shall be @150mm from the floor & ceiling level respectively. Rest shall be @900 mm c/c with no strip at the horizontal joint of the insulation.
- First layer of the Plasterboard shall be fixed vertically to other side of the metal studs with 25mm drywall screws at 300mm centers. All vertical & Horizontal joints shall be staggered.
- Second layer of the Plasterboard shall be fixed up to soffit height both sides shall be fixed in such a way that all vertical & horizontal joints are staggered with the first layer using 35mm drywall screws. Also, all horizontal joints of the second layer shall be secured at 150mm centers.

Commented [TM41]: Suitable Drywall Screw

- All plasterboards joints need to be sealed with Jointing Tape & Drywall joint compound. Three applications are carried out to reinforce the Board joints.

- All Drywalls shall be installed & suitable for use under normal occupancy conditions. Buildings in which they are used shall be dry, glazed & enclosed.

Provision of services through metal profiles in drywall cavity. The drywall metal profiles shall have predetermined slots in Circular, H Type, or rectangular shape to in-house the services like electric pipes, plumbing etc.



7.Selection Criteria of metal profiles:

The drywall metal profiles are available in Different metal stud widths, Thickness, Shapes & length & are recommended to construct drywalls meeting performance criteria like fire Acoustics, Structural stability, Thermal insulation, Seismic, Planned & unplanned loadings, Openings, Finishing etc. OR as specified by user. The following guidelines shall be considered:

7.1. Environment: It is advisable to recommend metal profiles having higher corrosion resistance in Wet area & Humid conditions. The manufacturers should be able to provide salt spray test certificates to choose coating of profiles.

-Up to 70% Humidity: Minimum 400 hrs. of salt spray (zinc coating up to 120 GSM OR AZ 150)
-from 70 % to 90 Humidity: Minimum 600 hrs. of Salt spray (zinc coating 200 GSM)
- Use in wet areas: Minimum 1000 hrs. of Salt spray (AZ 150)

Commented [TM42]: Provide relevant Standard for reference

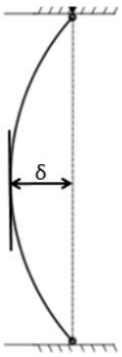
7.2. Fire Resistance, Acoustics, Thermal (U values) Seismic, for the assemblies: It shall be mutually agreed between the manufacturer & user depending upon type of performance required from overall drywall in use or mixed-use type of buildings. This will also be dependent upon type of substrates & finishing materials chosen by the end-user. The user shall refer to the Tested drywall systems or other drywall system recommendations having nomenclature of metal profiles like thickness, width, spacing, type of substrates etc.

7.3. Load Calculation: For dead load calculation, reference to be made to IS 875 Part-1, for live load calculation, reference to be made to IS 875-2 and for seismic load, IS 1893/IS 16700 should be referred.

Commented [TM43]: Standards refers to Structural Safety of Tall Concrete Buildings... Remove

7.4. Structural stability, Openings: The thickness, Width of drywall metal profiles shall be decided basis the structural stability & minimum deflection needed by the user. This shall be supported by 3rd party reports as agreed by the manufacturer & the user.

7.5. Deflection Criteria: Deflection of Drywall Deflection is the degree to which the partition system displaces for the applied pressure, it is denoted by δ, refer to the figure for the schematic of partition showing deflection.



Schematic of Drywall Simplified classical formula (for an instance) used to calculate deflection (δ) of drywall.

$$\delta_{max} = \frac{l^4 5\omega}{384EI}$$

Details of parameter

δ - Deflection

ω – Pressure in Pascal

L = Height of Drywall

EI = Bending stiffness of drywall

Deflection limit generally ranges between L/120 and L/360 is derived in the building codes based on serviceability limits, metal studs play a major role in the deflection of drywall, relaxing deflection criteria more than L/120 will lead to more deflection and cause permanent deformation in drywall as well as cause damages to finishing. Tightening the deflection criteria more than L/360 will lead to over designing of drywall, therefore the range is defined.

Load is derived in the building codes from crowd pressure, generally ranges from 200 Pa to 480 Pa for interior applications, reachable drywall height is calculated based on deflection criteria with respect to applied pressure. Range is selected based on the application with agreement of supplier and purchaser.

8. Storage and transportation.

8.1. Storage: Drywall metal section and accessories should be stored in well ventilated, dry place and be referred to the storage guidelines from the manufacturer.

8.2. Transportation: Drywall metal section and accessories should be transported in fully covered vehicle and should not be clubbed with other chemical reacting material, soft material which can damage metal sections during transportation. The transportation guidelines from the manufacturer should also be referred.

9. PACKAGING AND MARKING

9.1.Packaging. The possible types of temporary surface protection can be as follows:

1. Shrink wrapping.
2. Jute cloth

These can be wrapped as a possible option resulting in surface & Sunlight protection, High humidity & direct water ingress or chemicals. As a precaution, the end of metal profiles (both the cut edges) shall be protected by suitable designed edge caps. The metal profiles shall be stored in

9.2. Marking

The metal framing components for drywalls should be clearly and legibly marked with the following information:

- IS No. of this standard.
- Manufacturers name or trademark.
- Manufacturing batch number date & time
- Product dimensions, Steel grade, Coating class
- Customer care number

Commented [TM44]: Customer Care No is mentioned in all Invoices

Annexture- 01

Example of calculation of Metal Profile properties

Symbols

For calculation purposes the following symbols --

x-x along the section.

y-y the axis of symmetry of the cross-section.

z-z minor axis perpendicular to the flanges.

Iyy second moment of inertia about the y-y-axis.

t minimum core thickness.

Commented [TM45]: Sheet / Coil Thickness

$I_{yy} = (AB^3)/12 - (A-2t)(B-2t)^3/12 - t(B-2C)^3/12$

A = 35mm B = 70mm C= 5mm t = 0.5mm

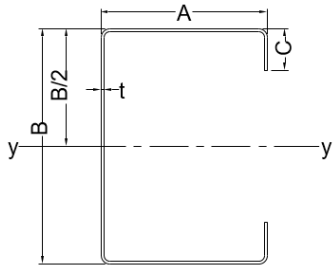


Fig.4: Area Moment of Inertia Overview

Calculation gives $I_{yy} = 60.6 \times 10^3 \text{ mm}^4$

Case Study on Importance of Base Metal Thickness

Following calculation is based on real time testing with the size of height of 3600mm and width of 1200 mm as shown in fig.4a, test is carried-out by applying uniformly distributed pressure of 200Pascal and deflection criteria is L/240. Stud size 70mm with 0.5 mm base metal thickness, stud spacing is 600mm and board thickness of 12.5mm.

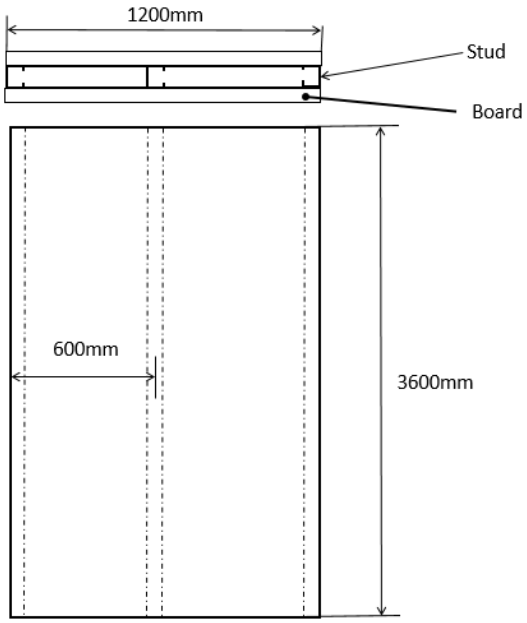


Fig: Dry Wall Specimen

Test Results

Drywall Stiffness (EI) is calculated from deflection and applied pressure of real-time testing, based on following formula.

$$EI = \frac{l^4 5\omega}{384\,\delta_{max}}$$

Measurements from the testing:

δ – Deflection = 14.55 mm

ω – Pressure in Pascal = 200 Pa

L = Height of Drywall = 3600 mm

Drywall stiffness (EI) = Bending stiffness of drywall = 30 x 10^9 Nmm^2

Drywall stiffness (EI) = Metal stud stiffness + Board Stiffness

Stiffness of Metal stud (EI) = 21.2 x 10^9 N mm^2 (deducting board stiffness of 8.8 x 10^9 N mm^2 from drywall stiffness)

Young's modulus of Stud which made up of GI sheet (E) = 200 Gpa

$$\textbf{Metal Frame Stiffness per meter} = \frac{Iyy.E}{\text{Stud Spacing in meter}}$$

$$Iyy = \frac{\text{Stud spacing in meter} * \text{Metal Frame stiffness per meter}}{E}$$

Metal frame Stiffness per meter = 21.2 x 10^9 N mm^2

Young's modulus (E) = 200 Gpa

Stud spacing = 0.6m

Iyy = (0.6 x 21.1 x 109)/ 210 = 60. 6 x 10^3 mm^4 with 0.5 mm of base metal thickness which is required to achieve 3600mm of drywall height. For an instance reducing base metal thickness to 0.4mm, area moment of inertia of metal stud drops significantly to 48.8 x 10^3 mm^4, which is ~ 20 % reduction in area moment of inertia (between 0.5 BMT and 0.4 BMT), hence reachable drywall height also would go down to ~ 5- 10%.

From above example it is understood that area moment of inertia of metal stud is key in metal as well as drywall stiffness. Base metal thickness of 0.5 mm is very important to achieve required area moment of inertia, if not stiffness of metal stud and dry wall is affected significantly in terms of reachable drywall height.

Annexture- 02

Measurement of Metal Profiles

Thickness- Measurement of thickness to be done with Screw Guage at three separate positions on a respective surface area free from any profiling or distortion from cutting. Record the results for thickness nearest to 0.01mm.

Dimensions- Measurement of all dimensions to be done with Vernier Caliper at three separate positions. Record the results for each dimension, nearest to 0.1mm.

Length- Place the specimen on the flat surface and measure the length along the web using the metallic measuring tape. Record the results for length, nearest to 1.0mm.